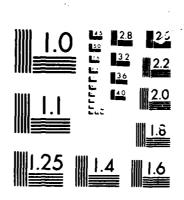
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# INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION STAGE 1

MOUNTAIN HOME AIR FORCE BASE MOUNTAIN HOME, IDAHO

DAMES & MOORE 1550 NORTHWEST HIGHWAY PARK RIDGE, ILLINOIS 60068

FEBRUARY 24, 1986

FINAL REPORT

APPROVED FOR PUBLIC RELEASE DISTRIBUTION UNLIMITED

PREPARED FOR
TACTICAL AIR COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

UNITED STATES AIR FORCE
OCCUPATIONAL & ENVIRONMENTAL HEALTH LABORATORY (USAFOEHL)
TECHNICAL SERVICES DIVISION (TS)
BROOKS AIR FORCE BASE, TEXAS 78235-5501



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FINAL REPORT

FOR

MOUNTAIN HOME AIR FORCE BASE MOUNTAIN HOME, IDAHO

TACTICAL AIR COMMAND LANGLEY AIR FORCE BASE, VIRGINIA

**FEBRUARY 24, 1986** 

PREPARED BY

DAMES & MOORE 1550 NORTHWEST HIGHWAY PARK RIDGE, ILLINOIS 60068

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### **PREFACE**

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As part of the U.S. Air Force Installation Restoration Program (IRP), investigations were undertaken at five sites on Mountain Home Air Force Base, Idaho, to determine whether hazardous material contamination is present. This report, prepared by Dames & Moore under Contract No. F33615-83-D-4002, Order 0009, presents the results of the Phase II, Stage 1 IRP investigations. The period of work reported on herein was January through September 1984. The field investigations were directed by Dr. Kenneth J. Stimpfl and were undertaken under the technical management of Mr. George W. Condrat. Field work was undertaken by Mr. Steven B. Johnson. Maj. George New and Dr. John Yu, Technical Services Division, USAF Occupational and Environmental Health Laboratory (OEHL), were the technical monitors.

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### SUMMARY

Mountain Home Air Force Base (AFB) is located approximately 10 miles southwest of Mountain Home, Idaho. It is situated on the Mountain Home Plateau, which is a rolling upland plain underlain by over 10,000 feet of volcanic and sedimentary rock. The base has been in operation since 1943 and currently houses tactical fighter squadrons that use the F-111A and the EF-111A aircraft.

The Phase II, Stage 1 field evaluation of the Installation Restoration Program (IRP) consisted of investigations at the following five sites:

Site 1 - Lagoon landfill,

Site 2 - "B" Street landfill,

Site 8 - Existing fire department training area,

Site 11 - Fuel hydrant system leak/spill area, and

Site 12 - Entomology shop yard.

The field investigation consisted of the following activities:

- o Installation and sampling of a monitor well at Site 1 and Site 2;
- o Sampling of base wells MH-1, MH-3, MH-4, MH-5, MH-6, and MH-7, and the east and west wastewater lagoons at Site 1;
- o Drilling and sampling three borings at Site 8;
- o Drilling and sampling three borings at Site 11; and
- o Drilling and sampling three borings at Site 12.

The ground water samples were analyzed for 16 pesticides, 5 trace metals, oil and grease, phenol, total organic carbon (TOC), and total organic halogens (TOX). The soil samples from Sites 8 and 11 were analyzed for moisture content, TOX, TOC, oil and grease, phenol, and lead. The soil samples from Site 12 were analyzed for moisture content and 16 pesticides by EP toxicity test extraction.

Ground water is available from the Bruneau and Glenns Ferry Formations beneath the site, although all the base wells and monitor wells are completed in the Bruneau Formation. Both formations contain highly permeable layers of fractured and porous basalt and coarse sand and gravel. The formations behave as a single aquifer in which ground water is present under unconfined conditions. Ground water quality is suitable for most purposes, although the concentrations of total dissolved solids have been increasing in water from base wells MH-2, MH-3, and MH-4 since about 1960 and had increased in old base well MH-1 until it was replaced in 1974. The source of the dissolved solids is either upward flow from the Glenns Ferry Formation, which contains slightly lower quality water than the Bruneau Formation, or downward migration of contaminants such as nitrate, chlorides, and sulfates. Regional ground water flow is generally toward the south, where it eventually discharges into the Snake River.

ground water analyses showed evidence of organic ground water contamination based on TOX concentrations in one base well and both monitor well samples. Halogenated organic compounds (TOX) are present in ground water beneath the entire base, but levels in the range of 0.059 to 0.086 milligrams per liter (mg/L) are believed to represent background levels. In contrast, TOC concentrations were too low to interpret them conclusively as either background or contaminated conditions. Although there is evidence that the waste disposal sites are the sources, it is possible that contaminants also originate from off-site sources. levels of contaminants were found in soil samples from Site 11, where several thousand gallons of jet fuel were spilled in the late 1950s. Relatively high concentrations of TOX, TOC, and oil and grease were detected at Site 8, the fire department training area. The greatest contamination was within the bermed area in which jet fuel is pooled before it is burned for training exercises. Seven of the 16 pesticides included in the analyses were detected in EP toxicity test extracts of soil samples from Site 12, adjacent to the entomology shop building. Dieldrin was found in all the samples, and DDD was found in all but one of the samples. The remaining 5 pesticides were detected in 1 or 2 samples each. Only samples from the upper 1 foot of soil were analyzed, so it is not known how deep the pesticides are Similarly, the areal extent cannot be estimated based on Phase II, Stage 1 results. The pesticide concentrations in the EP toxicity test extracts were very low.

The Phase II, Stage 1 conclusions are as follows:

- 1. Evidence of ground water contamination was identified by the presence of TOX (total organic halogens) in one base well and one monitor well. The concentrations in both were 0.12 mg/L. No pesticides were detected in the monitor well samples, so the organic halogens may be due to solvents, herbicides, or other organic contaminants. TOC (total organic carbon) concentrations were too low to conclusively indicate background or contaminated conditions. The magnitude and associated health lisk cannot be assessed until the individual compounds contributing to TOX are known.
- 2. High TOX concentrations and seven pesticides were detected in the lagoon samples, indicating that the lagoons may be a source of the ground water contaminants. The highest concentrations of TOX in the ground water samples were 0.12 mg/L from Monitor Well 1 (MW-1), which was completed beneath the lagoon landfill, and 0.12 mg/L from base well MH-3.
- 3. No significant contamination was found at Site 11.
- 4. Evidence of contamination was identified at Site 8; however, the depth of contamination could not be determined from Phase II, Stage 1 results.

Because hazardous wastes may be migrating from the site through infiltration of jet fuel, there is a potential that it may be a source of organic contaminants that could eventually reach the ground water.

5. Soil adjacent to the entomology shop (Site 12) has been contaminated with pesticides to a depth of at least 1 foot, although the areal extent could not be estimated from Phase II, Stage 1 results. Based on chemical analyses of EP toxicity test extractions of soil samples, the contamination is extremely low and does not warrant further investigation.

The following summarizes our recommendations and the rationale for further activities:

Sites

### Recommended Action

### Rationale

1 and 2, base wells Develop an accurate ground water elevation map by surveying elevation and location of base wells and monitor wells. Based on the results of the survey, determine whether Monitor Well 2 (MW-2) is upgradient or downgradient of the "B" Street landfill. If MW-2 is downgradient, no further work should be done at Site 2. If MW-2 is determined to be upgradient of the landfill. three additional monitor wells should be installed downgradient. If the results of the survey do not clearly indicate whether MW-2 is upgradient or downgradient, install one well upgradient and three wells downgradient as defined by the ground water elevation map. At Site 1, install four monitor wells. Place one well upgradient and three wells downgradient. Sample the eight new wells: operating base wells MH-1, MH-3, and MH-5; MW-1 and MW-2 (if needed); and the two lagoons; measure pH, specific conductance, and temperature; and analyze the samples for USEPA 601 and 602 parameters, major cations and anions, and

cadmium.

To characterize the organic and inorganic content of ground water beneath the base and define the ground water flow system.

Sites	Recommended Action	Rationale
8	Drill and sample one background boring and two additional borings to depths at which soil samples do not emit organic vapors.  Analyze soil samples for volatile and semivolatile organics, oil and grease, and moisture content.	To estimate the vertical extent of contamination and determine whether the site is a potential source of ground water contamination.

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### I. INTRODUCTION

### A. BACKGROUND

The Department of Defense (DOD) initiated the Installation Restoration Program (IRP) in 1976 to investigate and mitigate any environmental contamination which may be present at DOD facilities as a result of handling or disposing hazardous materials. IRP was revised in 1981 and reissued as the Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5. The Air Force implemented DEQPPM 81-5 in 1982 as a four-phased program:

Phase I Problem Identification/Records Search

Phase II Problem Confirmation and Quantification

o Presurvey

o Field Evaluation - several stages as warranted

Phase III Technology Base Development

Phase IV Corrective Action

Phase I was completed by CH2M Hill (1983), and the Phase II Presurvey was completed by Dames & Moore (1983). Dames & Moore has been retained by the Air Force under Contract Number F33615-83-D-4002 to conduct Phase II, Stage 1, Field Evaluation, at Mountain Home Air Force Base (AFB) near Mountain Home, Idaho.

This report presents the results of Dames & Moore's field and laboratory investigations in the vicinity of waste disposal and hazardous material handling areas at Mountain Home AFB.

### B. PURPOSE AND SCOPE

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The purposes of the field evaluation portion of Phase II of the IRP were as follows:

- Determine whether environmental contamination has resulted from material handling or waste disposal practices at Mountain Home AFB;
- 2. If contamination is found, provide estimates of the magnitude and extent of the contamination; and
- Identify any additional investigations and their attendant costs necessary to identify the magnitude, extent, and direction of movement of discovered contaminants.

The scope of work as outlined for Phase II, Stage 1 of the IRP consisted of the following activities:

- 1. Drilling, sampling, and geologically logging one boring to a depth of 402 feet at the lagoon landfill (Site 1) and one boring to a depth of 410 feet in the "B" Street landfill (Site 2).
- 2. Installing and developing a monitor well in each boring.

STATE THAT THE STATE OF

- 3. Sampling the two monitor wells; base wells MH-1, MH-3, MH-4, MH-5, MH-6, and MH-7; and the east and west wastewater lagoons.
- 4. Analyzing the ground water and lagoon samples for 25 parameters, including trace metals, pesticides, and others.
- 5. Drilling, soil sampling, and geologically logging three borings at the existing fire department training area (Site 8), three borings at the fuel hydrant system leak/spill area (Site 11) and three borings at the entomology shop yard (Site 12).
- 6. Analyzing selected soil samples from each site for specific constituents, including total organic halogens (TOX), total organic carbon (TOC), oil and grease, metals, phenols, and pesticides.
- 7. Preparing this report, which presents our findings and recommendations.

Field work began on 26 March 84 and was completed on 14 April 84.

# C. BRIEF HISTORY OF MOUNTAIN HOME AFB AND WASTE DISPOSAL OPERATIONS

Mountain Home AFB is located about 10 miles southwest of Mountain Home, Idaho (see Plate 1). It was established in 1943 and served as a base for several different bombardment groups until it was deactivated in the fall of 1945. The base served as a Strategic Air Command base between 1948 and 1950 and later between 1953 and 1965. The Tactical Air Command has controlled the base since 1965. The current mission of the base is to develop and maintain tactical fighter squadrons. The principal aircraft flown at the base are the F-111A and the EF-111A.

Hazardous wastes and chemicals have been used and generated at Mountain Home AFB since 1943 for aircraft maintenance and other industrial operations. These activities generated between 20,600 to 40,000 gallons per year of waste oils, fuels, solvents, paints, and paint thinners (CH2M Hill, 1983). Other wastes generated by the base include sanitary sewage and refuse. In the past, the hazardous wastes have been disposed of by one or more of the following methods:

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- o Incineration through fire department training exercises;
- o Dumping at the lagoo 'andfill or "B" Street landfill; and/or
- o Discharging to the sanitary sewer, road oiling, or collection and removal by a contractor.

Since 1969, the wastes have been collected by a contractor or sent to the Defense Property Disposal Office for sale.

### D. DESCRIPTION OF SITES

CH2M Hill (1983) identified 17 sites where hazardous materials had been handled, spilled, or disposed of within Mountain Home AFB. The following sites received the highest ratings for environmental impact and were investigated during Phase II, Stage 1:

- 1. Lagoon landfill (Site 1),
- 2. "B" Street landfill (Site 2),
- 3. Existing fire department training area (Site 8),
- 4. Fuel hydrant system leak/spill area (Site 11), and
- 5. Entomology shop yard (Site 12).

The sites investigated during Phase II, Stage 1 are shown in Plate 2, and each site is described below.

### 1. Site 1 - Lagoon Landfill

The lagoon landfill is located on the west side of the base at the site of the current wastewater lagoons. This site served as the main base sanitary landfill between 1952 and 1956, and the wastewater lagoons were constructed in 1961 and 1962. The landfill received general refuse, which was burned, and about six drums per month of mineral oils, hydraulic fluids, engine oils, and solvents such as trichloroethylene and carbon tetrachloride. Their potential for environmental impact is considered high due to the possibility for infiltration from the wastewater lagoons to leach hazardous contaminants from the underlying landfill.

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PLATE 2

The wastewater treatment system now located at Site 1 consists of four oxidation lagoons occupying a total of 72.8 acres with an average water depth of Currently, daily flow to the treatment system averages about Oil/water separators collect waste oils and lubricants 800,000 gallons of sewage. from the industrial shop discharges. Water and sediments from the oil/water separators are disposed of at the "B" Street landfill (Site 2). Disposal of the wastewater effluent is by evaporation and percolation from the lagoons. normal conditions, no effluent leaves the base, so no National Pollutant Discharge Elimination System (NPDES) permit is required. Overflow from the lagoons is captured in two infiltration ponds. According to CH2M Hill (1983), measurements of biochemical oxygen demand (BOD<sub>5</sub>), nitrate, nitrogen, total Kjeldahl nitrogen, oil and grease, total phosphorous, pH, and chromium in the effluent show that the treatment system operates well. Further, no chromium was detected in the lagoon influent or effluent.

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### 2. Site 2 - "B" Street Landfill

The "B" Street landfill is located in the northwest corner of the base and served as the main base sanitary landfill between 1956 and 1969, when the existing landfill went into operation. Materials dumped at the landfill included general refuse such as garbage, concrete, rubble, fill, empty drums, and trees, and industrial wastes such as waste oils, fly ash from the heat plant, solvents, jet fuel, tank-cleaning sludge, and possibly up to 20 drums of DDT. Refuse and wastes were placed in trenches 12 to 14 feet deep and either burned or covered with fill. Currently, the site is covered by small piles of dirt fill, concrete, rubble, empty drums, and refuse. Some of the shallow trenches are still visible. The potential for environmental impact at Site 2 is based on the suspected presence of hazardous wastes in the landfill.

### 3. Site 8 - Existing Fire Department Training Area

Site 8 is located about 1,000 feet southeast of the end of the flight line and has been used as a training site for the fire department since 1962. The site consists of two buildings and a burn area in which a steel aircraft skeleton is encircled by low earthen berms. Prior to 1975, waste fuel, oils, and lubricants were burned in the fire department exercises, but thereafter only jet fuel (JP-4) has been used. Exercises are currently conducted one to three times per month and consume 300 to 500 gallons of fuel for each fire. Although most of the fuel is probably consumed by the fire, the potential for environmental impact at this site is based on the portion of the fuel remaining in the soil.

### 4. Site 11 - Fuel Hydrant System Leak/Spill Area

Site 11 is located on the flight line between the No. 3 and No. 4 jet fuel hydrant stations. As much as 64,000 gallons of jet fuel were spilled in the vicinity of Site 11 in two incidents in the late 1950s. The potential for environmental impact is based on the possibility that fuel may still remain below the ground surface.

### 5. Site 12 - Entomology Shop Yard

Site 12 is located immediately northwest of the entomology shop, Building No. 2206. Pesticide (insecticides, herbicides, and rodenticides) application equipment has been filled and cleaned in this building since the late 1960s. Prior to about 1981, wash water was allowed to drain outside the building on the ground surface. Currently, the wash water is collected in an underground tank and analyzed before disposal. Past soil samples from this site have yielded low concentrations of several pesticides, including DDT. The potential for environmental impact is based on the presence of pesticides at the site.

### E. IDENTIFICATION OF POLLUTANTS SAMPLED

Chemical analyses of ground water and soil samples included some or all of the parameters listed in Table 1. Ground water samples from the monitor wells and the base wells were analyzed for all the parameters in Table 1 plus field measurements of pH, specific conductance, and temperature. Soil samples from Site 8 were analyzed for TOX, TOC, oil and grease, total metals, and phenols. Soil samples from Site 11 were analyzed for TOX, TOC, oil and grease, and heavy metals. Soil samples from Site 12 were analyzed only for insecticides using EP toxicity extraction.

### F. IDENTIFICATION OF THE FIELD TEAM

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The field work required for Phase II, Stage 1 was completed by Mr. Steven Johnson, Staff Hydrologist, who supervised both the monitor well installation and soil sampling activities. Appendix F contains a description of his qualifications.

TABLE 1

PARAMETERS, LIMITS OF DETECTION FOR SOIL AND GROUND WATER ANALYSES,

AND WATER QUALITY STANDARDS

Constituent	Limit of Detection, Soil	Limit of Detection, Water (µg/L)	Public Drinking Water Standard (μg/L)
Pesticides*			
Aldrin	0.01 μg/L	0.005	
p,p'-DDT	0.05 μg/L	0.02	
o,p-DDT	0.05 µg/L	0.02	
DDD	0.02 μg/L	0.01	
DDE	0.02 μg/L	0.01	
Dieldrin	0.01 μg/L	0.005	
Endrin	0.01 μg/L	0.005	0.2
Heptachlor	0.01 μg/L	0.0ú5	
Heptachlor Epoxide	0.01 μg/L	0.005	
Lindane	0.01 μg/L	0.005	4.
Methoxychlor	0.1 μg/L	0.1	100.
Chlordane	0.2 μg/L	0.2	
Toxaphene	1.0 μg/L	1.	5•
alpha-BHC	0.01 μg/L	0.005	
beta-BHC	0.01 μg/L	0.01	
delta-BHC	0.01 μg/L	0.005	
Heavy Metals			
Cadmium	NA	10	10.
Chromium	NA	5	50.
Lead	10 μg/g	10	50.
Nickel	NA	60	
Silver	NA	10	50.
Others			
Oil and Grease	0.06 mg/g	400	
Phenol	5 μg/g	10	
Total Organic Carbon	0.01 mg/g	1000	
Total Organic Halogens	5 μg/g	10	

<sup>\*</sup>Pesticides extracted from soil using EP toxicity extraction procedure; detection limit is for extract.

NOTE: NA = Not analyzed

property property property appropriate

mg/g = milligrams per gram  $\mu g/L$  = micrograms per liter  $\mu g/g$  = micrograms per gram

### II. ENVIRONMENTAL SETTING

### A. GEOGRAPHIC LOCATION

Mountain Home AFB occupies about 5,800 acres in Elmore County, Idaho on a plateau about 2 miles north of the Snake River (see Plate 1). The base is about 10 miles southwest of the city of Mountain Home and about 50 miles southeast of Boise.

The base is located on the Mountain Home Plateau, which is a rolling upland plain with occasional volcanic cones or buttes rising several tens to a few hundred feet above the plain. The elevation of the plain ranges from 2,700 feet to about 3,200 feet and is about 3,000 feet in the vicinity of the base (Mundorff et al., 1964). The surface of the plain rises 300 to 500 feet above the Snake River, which flows along the southern edge of the plateau.

The Mountain Home Plateau is drained by several intermittent streams that are tributaries of the Snake River. Canyon Creek is an intermittent stream closest to the base and receives stormwater that is occasionally discharged from a dam along the north side of the west wastewater lagoon.

The average annual precipitation at the base is about 8 inches and falls principally in the winter and spring. Mean monthly temperatures range from 30°F in January to 76°F in July. Annual average lake evaporation in the vicinity of the base is about 35 inches (CH2M Hill, 1983). Therefore, the potential of local precipitation infiltrating directly into the aquifer is small.

### B. REGIONAL GEOLOGY AND HYDROGEOLOGY

The Mountain Home Plateau is underlain by over 10,000 feet of volcanic and sedimentary rock, which was deposited upon the Idaho Batholith. Batholith is composed of silicic volcanic rocks and forms a trough in which the overlying sediments and volcanic rocks were deposited. In ascending order, the formations overlying the Idaho Batholith include the Miocene Age Idavada Volcanics, consisting of about 2,000 feet of silicic volcanic rocks. Next in the sequence is the Idaho Group, ranging in age from Pleistocene to Pliocene and consisting of the Glenns Ferry Formation and the Bruneau Formation. These two formations consist of basalt flows interbedded with layers of silt and sand that were deposited during interflow periods. Overlying the Idaho Group is basalt of the Snake River Group, which is Holocene and Pleistocene in age, and unconsolidated alluvial deposits, for a total thickness of about 900 feet. The basalt of the Snake River Group consists of up to 550 feet of several basalt flows, which originated from volcanic sources as much as 60 miles east of the base (Malde et al., 1963). Bedrock beneath the plateau is mantled by a thin layer of eolian sand and silt.

All of the formations underlying the Mountain Home plateau yield varying amounts of ground water. The most important aquifers are the Bruneau and Glenns Ferry Formations of the Idaho Group, which comprise a regional deep aquifer. Also present in some areas is a localized shallow aquifer comprised of alluvium in which the saturated thickness is adequate to yield a usable amount of water to wells.

Both the Bruneau and Glenns Ferry Formations contain highly permeable layers of fractured and porous basalt and coarse sand and gravel. Well yields range up to 350 gallons per minute (gpm) from the Glenns Ferry and up to 3,500 gpm from the Bruneau (Young, 1977). Depth to ground water is generally 200 to 400 feet below ground (Norton et al., 1982). Ground water quality in the regional aquifer is suitable for most purposes. Specific conductance is generally less than 500 µmhos/cm with low hardness and low concentrations of major ions such as calcium, magnesium, potassium, sulfate, and nitrate (Parliman, 1982). Regional ground water flows toward the south and discharges into the Snake River, often in the form of springs or seeps emanating from the steep margins of the plateau. Two large springs, Halls Ferry Springs and Weatherby Springs, issue from the Bruneau Formation at points in the Snake River Canyon directly south of the base.

The main body of shallow ground water in the vicinity of the base underlies the city of Mountain Home. The perched ground water is maintained by leakage from the Mountain Home Reservoir and water distribution canals and from infiltration from Rattlesnake Creek and Canyon Creek. Depth to water is highly variable, ranging from less than 10 feet to more than 100 feet. Shallow ground water flows southward and eventually recharges the deeper, regional aquifer (Norton et al., 1982).

The principal recharge area for the aquifer underlying the Mountain Home Plateau is in the mountains north of the Plateau, where precipitation infiltrates directly into rock outcrops. Recharge from the plateau's surface is very limited because of the low annual precipitation, relatively high evaporation rate, and the deep water table. A small amount of recharge is provided by deep percolation of intermittent stream flow and excess irrigation water.

### C. GENERAL BASE HYDROGEOLOGY

The volcanic rocks and alluvial deposits in the vicinity of Mountain Home AFB generally behave as a single unconfined aquifer. However, locally confined conditions may occur due to the presence of discontinuous layers of slowly permeable materials. Ground water in the base vicinity is available mainly from the fractures, cinder zones, and interflow zones in the basalts of the Bruneau Formation, in which the depth to water ranges up to several hundred feet below ground. All of the base wells and private wells located within 2 miles of the base are completed in the

Bruneau Formation (see Tables 2 and 3). Ground water is also available from saturated gravel aquifers in stream channels and from the Glenns Ferry Formation.

Ground water levels were measured in areas near the base in 1976 (Young, 1977), 1980 (Lindholm, 1983), and 1981 (Norton et al., 1982). Depth to water ranged from 300 feet to more than 600 feet below ground or from elevation 2800 near Mountain Home to 2650 beneath the base. The water table in these years sloped toward the south, southwest, and west and showed significant cones of depression centered beneath Mountain Home, the Cinder Cone Butte area, and an area immediately east of the base. In 1981, the latter cone of depression contributed an easterly component to ground water flow causing the water table to slope to the southeast at a rate of about 30 feet per mile.

Hydrographs shown by Norton et al. (1982) show that ground water levels have been declining at 2 to 4 feet per year since 1967. The decline is due to excessive pumping and below average recharge to the aquifer. As of 1980, about 600 acre-feet per year (ac-ft/yr) was being mined from the regional aquifer beneath the Mountain Home Plateau, and currently approved ground water permits would increase the deficit to 28,100 ac-ft/yr when they are developed. In addition to excessive withdrawals, recharge decreased below normal between 1974 and 1980. Although precipitation was above normal at Mountain Home during that period, it was below normal in the mountains east of the plateau, where the regional aquifer is recharged by precipitation falling on rock outcrops. Precipitation falling on the plateau is a less important source of recharge.

The pumping rates of base wells and private wells within 2 miles of the base indicate that the regional aquifer is highly transmissive. The specific capacity of a well is the rate of discharge in gallons per minute produced by the well per foot of drawdown (gpm/ft) and is proportional to the transmissivity of the aquifer. Specific capacities of the base wells are listed in Table 2 and ranged from 50 to 257 gpm/ft. Specific capacities reported for private wells ranged from 40 to 412 gpm/ft (see Table 3). Using the method of Theis (1963) for converting specific capacity to transmissivity and a storage coefficient of 0.03 from Mundorff et al. (1964), the transmissivity ranges from 65,000 to 650,000 gallons per day per foot (gpd/ft). These values are within the range of transmissivities reported by Mundorff et al. (1964) from pumping tests in wells in other areas of the Snake River Plain aquifer. Their values ranged from a few thousand to tens of millions of gallons per day per foot.

TABLE 2

# BASE WELL CONSTRUCTION DETAILS

				Hole	Casing		Depth to	1967 Depth	Well	Specific
	SOSU	Local	Date	Size	Size	Depth	Water/Date	to Water	Yield	Capacity
Well No.	9	Identifier No.	Constructed	(in.)	(in.)	(ft)	(ft)	(ft)	(map)	(gpm/ft)
MH-l inactive	ve 50	045 05E 21 CAD1	1942	12	89	409	331/1942	331	1	150
MH-1 new	95	045 05£ 28 DAB1	1974	22	16	450	319/1974	ł	1,600	1
MH-2	53	045 05£ 27 8C01	1943	12	80	588	316/1953	316	750	1
MH-3	54	045 05£ 21 8081	1943	12	8	425	330/1943	330	750	1
MH-4	55	045 05£ 28 BAD1	1955	24	18	379	309/1955	326	1,800	257
MH-5	57	045 05£ 33 0001	1953	80	9	425	326/1953	335	16	;
MH-6	51	045 05E 22 DAC1	1962	20	16	610	347/1962	347	009	164
MH-7	{	1	1983	16	16	505	341/1983	1	1,250	90
MH-8	{	04S 05E 27 CAA1	1983	16-24	14-20	540	368/1983	1	1,500	150

Source: USAF, Base Civil Engineer in CH2M Hill (1983) with modifications.

TABLE 3

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INVENTORY OF WELLS WITHIN 2 MILES OF HOUNTAIN HOME AFB

Use	٥	۵ ۵	۵ ،	<u> </u>	۵	٥	<u>a</u>	<u>a</u>	٥	۵	۵,	۵.	<b>-</b> ,	<u>a</u>	<b>-</b>	<b>-</b>	۵	<u>a</u>	<b>-</b>	۵	٥		-	_	٥	-	0	_	_	_	_	. :	≨	c	<b>-</b>	ے •	, <b>-</b> -	-
USGS Identifier													4S-5E-10CAC1		45-5£-1000A1							45-5E-19CBA1			45-5E-24AAB1	4S-5E-25BBC1							18-56 NOOFB1	45-5F-15BBC1	45-5f-194RC1	10-74-17-001		
Specific Capacity (qpm/ft)	<b>§</b> :	≨ :	≨:	≨	¥	¥	¥	¥	≨	¥	<b>≨</b> ∶	≨∶	07	≨ .	≨:	≨:	≨	¥	≨	≨	¥	¥	¥	¥	¥	≨	54	<b>≨</b> ∶	≨ .	412	ž	: :	≨ ≨	1	750	<b>2</b>	ž	≨
Length of Surface Seala	01	9 9	<b>5</b> 0	21	20	18	19	19	19	18	18	≨:	None	20	None	10	10	20	≨	20	18	¥	None	01	None	None	18	None	50	None	18	; ;	7 Y	€ ₹	<b>3</b>	<u> </u>	72	74
Water Level at Installation <sup>a</sup>	375	956	361	350	361	360	360	396	395	370	378	386	378	378	372	387	385	370	360	352	327	323	37.1	385	388	366	366	370	359	596	382	1 4	515 365b	38.7b	336b	320	327	331
Year Installed	1972	1972	1972	1973	1974	1981	1983	1979	1977	1976	1975	1974	1967	1971	1968	1966	1978	1972	1971	1974	1979	1967	1966	1967	1966	1964	1974	1966	1969	1967	1979		1966 1976	1976b	1976b	1981	1982	1982
Quarter	ਲੀ	<del>#</del> 8	;	MS.	허	버	¥	NS.	NS.	벌	Z	.s.	×.	š	MS.	MS.	Ž	ž	MS.	<b>y</b>	<u>y</u>	MS.	ઝ	¥	Ą	ž	MS.	MS	버	<u>y</u>	3	į	ਲ ਹ	3	2	2	2	쀨
Quarter	쒿	<del>2</del>	썱	M.S	ΝS	뀔	ž	MS	ž	닏	<b>X</b> S	벌	3	¥	MS	<b>y</b>	₹	NS.	MS	<b>y</b>	¥	ž	ž	Z	7	ž	벌	NS.	8	<u>y</u>	2	: ;	E Z	5 ₹	3	2	<u> </u>	쒿
Section	6	5 (	6	6	6	6	10	10	10	10	10	0.	01	<b>0</b> I	11	13	15	15	15	17	19	19	54	54	54	25	26	56	56	30	36	,	۶۶ ه	, 5	5 51	25	32	25
œ	35	× ;	<u>5</u> E	χ	<u>5</u>	<b>2</b> E	<b>2</b> E	<b>2</b> E	ž	5£	<b>2E</b>	<u>2</u>	<u>5</u> E	7	<u> 5E</u>	<b>2</b> £	<b>2</b> E	<u>5</u>	<u>5</u> E	×	<u>5</u> E	<u></u> 5£	5E	35	×	<u>۲</u>	<b>2E</b>	3	35	<b>5</b> £	35		× 5	4 5	4 5	7F	46	46
-	45	<b>4</b> S	5 7	45	45	48	45	45	45	45	45	48	45	45	45	48	45	48	45	45	48	45	45	45	45	48	48	45	48	48	4.5		4 V v	7 (	1	7 7	45	45
Depth	200	41/	410	200	432	525	475	530	520	475	510	570	90/	206	735	578	200	450	099	200	455	490	543	625	550	530	401	525	200	437	645	, ,	416	505	, ABS	430	410	445
Owner	Streeter	Covey	Strickland	Schiffaner	Parker	La Foy	Maupin	Locker	Strasters	Вешs	Streeter	Hernandez	Streeter	Streeter	Streeter	Reddekopp	LDS Church	Pettingill	Mereen	Neilson	Fisher	Fisher	Ramsey	Johnson	Reddekopp	Hickey	Peterman	Brooks	Brooks	Fisher	Holstein	ne it ers	Brooks			Brandt	Brandt	Brandt
Мар No.	7	7	<b>m</b> .	4	~	9	7	80	6	10	11	12	13	14	15	16	11	18	19	20	21	22	23	54	25	56	27	28	53	30	31	Ş	32	: 2	, <u>,</u>	\ <del>*</del>	3,7	38

Depth in feet below ground surface

Directes date water level was measured

NA = Not available; I = Irrigation; D = Domestic.

Well locations are shown in Plate 2.

Sources: Idaho Department of Water Resources; Young (1977); Norton et al. (1982); Parliman (1982)

Ground water quality in the regional aquifer is high enough for most purposes. Table 4 lists chemical analyses from the base wells that were sampled in 1980. The USEPA primary and secondary drinking water standards are also listed for comparison. With the exception of MH-3, concentrations of all the constituents meet both sets of standards.

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However, ground water quality has deteriorated since the initial base wells were installed in 1948. CH2M Hill (1982) noted that concentrations of nitrate, chloride, and sulfate in the former MH-1 steadily increased between 1960 and 1974, when the well was removed from service. Base wells MH-2, MH-3, MH-4, and MH-5 have also yielded increasing concentrations of nitrate, sulfate, and chloride since about 1960. The concentrations of those constituents in MH-6 have risen only slightly since 1964. Plate 3 shows the increase of specific conductance, which is a collective measurement of the dissolved ion concentration, in base well water since 1948.

Chemical analyses for base well water reported by Parliman (1982) show that all the principal cations and anions in the analyses except iron, manganese, phosphorus, and silica have increased in concentration since 1960. There are two primary sources for the ions: deep percolation of contaminants from the ground surface and mixing of ground water from the Glenns Ferry Formation with ground water in the Bruneau Formation.

The Glenns Ferry Formation yields lower quality ground water than the Bruneau Formation because it consists of lacustrine, fluvial, and floodplain sediments (Ralston and Chapman, 1968). Soluble ionic compounds were concentrated in the sediments during deposition by evaporation and subsequently leached by ground water. contrast, the Bruneau Formation consists primarily of resistant basalt, which contributes relatively few ions to solution. Table 5 compares the quality of water from two wells completed in the Glenns Ferry Formation with the pre-1958 ground water quality determined by the average of seven analyses of water from MH-3. The MH-3 analyses represent the ground water quality in the Bruneau Formation before it began deteriorating in about 1960 and are similar to pre-1958 analyses Ground water from the Glenns Ferry Formation contains from other base wells. significantly higher concentrations of chloride, sulfate, calcium, sodium, zinc, and other major ions than the MH-3 analyses. However, concentrations of nitrate, iron, manganese, and phosphorus are similar in the two sets of analyses.

TABLE 4

CHEMICAL ANALYSES OF BASE WELLS MH-1, MH-3, MH-5 AND MH-6 IN 1980

USEPA Primary (P) and Secondary (S) Drinking Water

Parameter	Drinking Water Standards	MH-1*	MH-3	MH-5	MH-6
Arsenic	0.05(P)	0.001	0.001	0.001	0.002
Alkalinity (as CaCO <sub>3</sub> )		130	120	76	60
Bicarbonate (as HCO <sub>3</sub> )		150	130	93	63
Calcium		60	130	59	33
Carbonate (as CO3)		5	7	ND	5
Chloride	250(5)	49	110	55	26
Fluoride	1.4 to 2.4(P)	1.1	0.1	0.1	0.1
Hardness		230	510	210	120
Iron	0.3(\$)	0.01	NA.	< 0.01	0.02
Magnesium		19	46	16	8.4
Manganese	0.05(S)	0.001	NA	< 0.001	< 0.001
Nitrate + Nitrite (as N)	10(P)	10	26	9.3	2.5
рН	6.5 to 8.5 (S)	8.4	8.2	8.6	
Phosphorus		0.04	0.04	0.02	
Potassium		9	6.8	6.5	
Selenium	0.01(P)	NA	ND	NA	NA
Silica		38	40	38	40
Sodium		24	41	24	18
Specific Conductance (µmhos/cm)		591	1,200	579	364
Sulfate	250(S)	83	240	90	66
Temperature (°C)		18.5	17.5	15	20
Total Dissolved Solids	500(S)	368	584	421	237
Zinc	5(5)	0.01	NA	0.39	< 0.003

<sup>\*</sup>New MH-1 installed in 1974.

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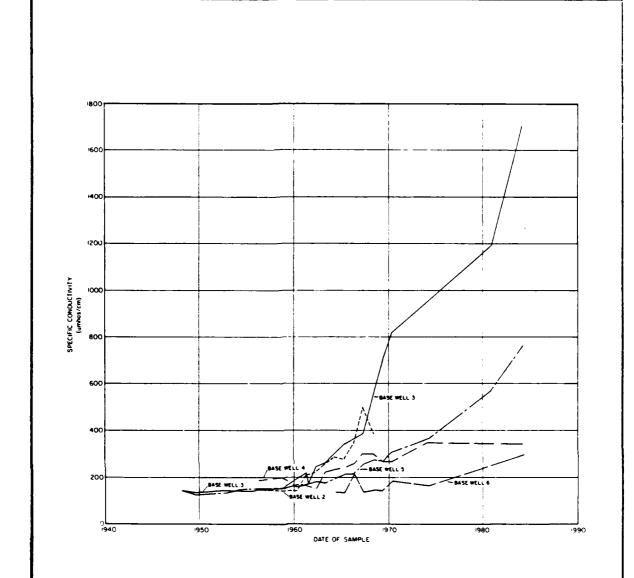
All concentrations in milligrams per liter unless otherwise specified.

Wells were sampled on 18 or 19 November 80.

NA = Not analyzed; ND = None detected.

Source: Parliman (1982).





# SPECIFIC CONDUCTIVITY OF BASE WELL WATER

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TABLE 5

COMPARISON OF CHEMICAL ANALYSES OF GROUND WATER FROM THE GLENNS FERRY FORMATION

AND THE BRUNEAU FORMATION

	Glenns Ferr	Bruneau Formation		
Parameter	Well No. 045 02E 25DAD1	Well No. 04S 03E 35BCA1	Base Well MH-3 Average of Pre-1958 Analyses	
Arsenic	0.007	0.018	NA	
Alkalinity (as CaCO <sub>3</sub> )	320	170	60	
Bicarbonate (as HCO <sub>3</sub> )	390	210	73	
Calcium	68	64	12	
Carbonate (as CO <sub>3</sub> )	ND	ND	NA.	
Chloride	28	22	3.1	
Fluoride	0.9	0.3	0.2	
Hardness	310	220	46	
Iron	< 0.01	NA.	0.03 "	
Magnesium	35	14	3.9	
Manganese	< 0.001	NA.	NA.	
Nitrate + Nitrite (as N)	1.1	0.92	1.5b	
рН	7.2	7.5	7.8	
Phosphorus	0.03	0.03	NA.	
Potassium	12	9.7	3.0	
Selenium	NA	0.001	NA.	
Silica	67	45	41	
Sodium	34	35	10	
Specific Conductance (μmhos/cm)	788	601	142	
Sulfate	61	85	6.5	
Temperature (°C)	18	18	17.2	
Total Dissolved Solids	499	378	116	
Zinc	0.49	NA	NA	
Date of Sampling	24 Sep 80	19 Aug 80	15 Jan 48 - 24 Apr 56 (7 Analyses)	

aThe two wells in the Glenns Ferry Formation listed are located approximately 22 to 25 miles west-southwest of the base.

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bExpressed as total nitrate (as N)

All concentrations in milligrams per liter unless otherwise specified.

NA = Not analyzed; ND = None detected

Source: Parliman (1982)

Table 6 was prepared to show the amount of dissolved material represented by the increase in concentrations of some of the parameters in the base well analyses The 1980 concentration of each parameter was between about 1960 and 1980. estimated by averaging the concentrations in Table 4, and the MH-3 analyses in Table 5 were the source of the 1958 concentrations. Other assumptions are given in The estimates show that several hundred tons of each constituent have been added to ground water in the Bruneau Formation to account for the increases between 1958 and 1980. Chloride concentration in the Glenns Ferry Formation is not high enough to account for the entire increase, although there could be locally higher concentrations than shown by the two analyses in Table 5. In the base vicinity, road and runway salting are likely sources of chloride. feedlots (Simplot), which are also potential sources of chloride, are downgradient from the base at the base of the Snake River bluffs. Increases in sulfate, calcium, and sodium may be due to mixing with water from the Glenns Ferry Formation, although deep percolation of excess irrigation water is suggested from analyses of MH-3, which is much higher in many constituents than waters from the Glenns Ferry Formation. In general, pre-1958 concentrations of nitrate in the Bruneau Formation and current concentrations of nitrate in the Glenns Ferry Formation are similar, suggesting deep percolation of fertilizers and excess irrigation water to the Bruneau Formation.

Although no current ground water levels from the Glenns Ferry Formation are available, it is possible that the water level in the Bruneau Formation could decline below the water level in the Glenns Ferry Formation and consequently induce an upward gradient between the formations. Upward flow from the Glenns Ferry Formation into the Bruneau Formation could follow fractures or other permeable zones in the basalt. Another alternative is that upward flow only occurs as a result of drawdown when particular base wells such as VH-2, VH-3, or VH-5 are in operation. The constantly declining water levels would induce an increasing amount of upward flow from the Glenns Ferry Formation.

### D. SITE-SPECIFIC GEOLOGY AND HYDROLOGY

This section presents the results of surface and subsurface investigations conducted during Phase II, Stage 1 at Sites 1, 2, 8, 11, and 12 at Mountain Home AFB. The field program is described in Section III, and the results of the chemical analyses are presented in Section IV. Monitor well and boring logs are presented in Appendix A.

TABLE 6

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ESTIMATED AMOUNTS OF MATERIALS ADDED TO GROUND WATER OF THE BRUNEAU FORMATION, 1958-1980

Possible Sources	Glenns Ferry Fm., road salting, septic tanks, feedlots	Glenns ferry fm., excess irrigation water	Glenns Ferry Fm., excess irrigation water	Glenns Ferry Fm., road salting, excess irrigation water	Fertilization, excess irrigation water, feedlots, septic tanks
Glenns Ferry Formation Concentration (mq/L)	22-28	61-85	64-68	34-35	0.92-1.1
Increase in Tons of Dissolved Material	009	1,100	570	170	100
Increase 1958 to 1980 (mg/L)	57	114	98	71	10
1980 Increase Concentration* 1958 to 1980 (mg/L) (mg/L)	09	120	07	27	12
1958 Concentration (mg/L)	3.1	6.5	12	01	1.5
Parameter	Chloride	Sulfate	Calcium	Sodium	Nitrate

Assumptions:

Source of analyses: 1958, Table 5; 1980, Table 4 (average of all wells). Aquifer area: 9 square miles Saturated thickness: 125 feet Porosity: 0.01

<sup>\*</sup>Concentrations taken as an average of base wells MH-1, MH-3, MH-5, and MH-6 sampled in November 1980.

### 1. Site 1 - Lagoon Landfill

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Site 1, known as the lagoon landfill, served as the main base landfill between 1952 and 1956, but has since been covered by the east and west wastewater lagoons (see Plate 2). One monitor well (MW-1) was installed at the midpoint of the dike between the two lagoons, which is the approximate center of the original landfill, as shown in Plate 4.

The subsurface profile at Site 1 consists of 24 feet of brown silty fine to coarse sand underlain by black vesicular basalt with fine-grained crystals of olivine and plagioclase, which was present to the completion depth of 402 feet. The basalt weathers to dark reddish brown and contains occasional layers of cinders or broken interflow zones. The depth to ground water was about 333 feet below ground.

### 2. Site 2 - "B" Street Landfill

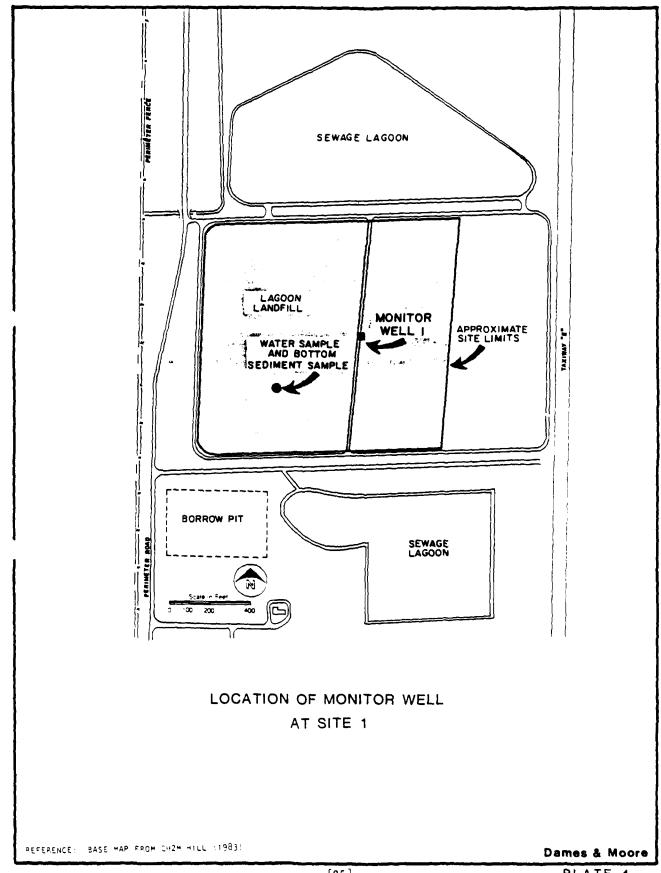
Site 2 is the "B" Street landfill and served as the main base sanitary landfill between 1956 and 1969. One monitor well (MW-2) was installed near the southwest side of Site 2 (Plate 5), where, based on the regional gradient, it would be approximately downgradient from the former landfill. Water level measurements taken in April of 1984 indicate that local pumpage may have locally reversed the gradient. A survey of well elevations and depth to water will be required to accurately determine the direction of ground water flow.

The subsurface profile beneath Site 2 consists of 18 feet of brown sandy silt with basalt fragments and caliche underlain by black vesicular basalt with fine-grained crystals of olivine and plagioclase, which extended to the completion depth of 410 feet. The basalt weathers dark reddish brown and contains occasional layers of cinders or broken interflow zones. The depth to ground water was about 354 feet below ground.

### 3. Site 8 - Existing Fire Department Training Area

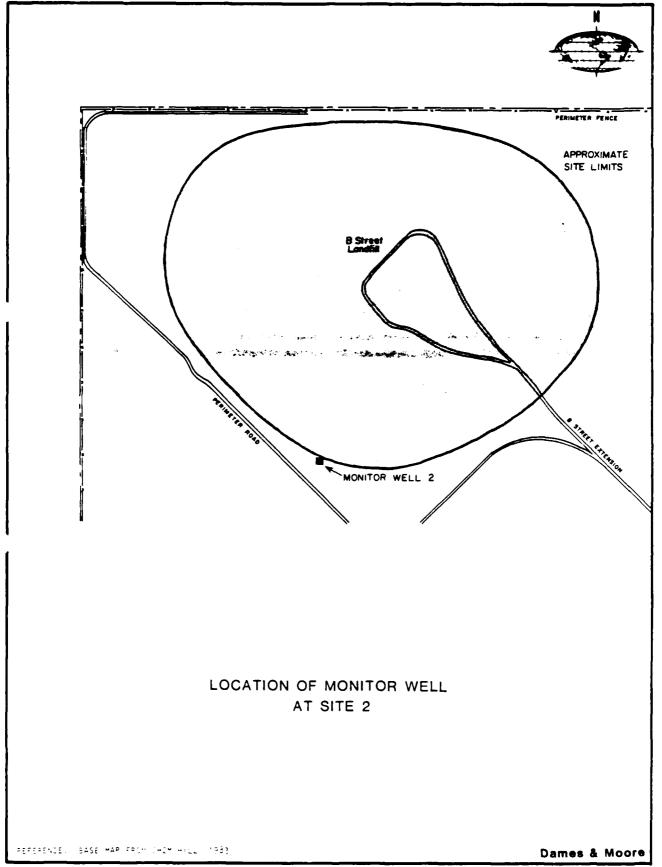
Site 8 is the current fire department training area. Three borings were drilled at the site. Borings DM-4 and DM-5 were drilled outside the bermed area, and Boring DM-6 was drilled inside the bermed area (Plate 6).

The ground surface at Site 8 consists of brown fine to coarse sand and gravel, which extends to a depth of about 6 inches. Gray silt with some fine sand and occasional caliche and gravel extended from the surficial unit to about 4 feet below ground. Brown silty, slightly to moderately calichefied, fine sand with occasional coarse sand or gravel was found between about 4 and 7 feet below ground. All three borings were terminated at 10.5 feet in brown fine to medium sand.



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The moisture content of the analyzed soil samples ranged from 2.2 percent to 15 percent. The concentrations of organic vapors measured by the HNU (photo-ionization detector) ranged from less than 1 to 195 ppm in all the borings. Hydrocarbon and septic-like odors were detected to a depth of about 8 feet below ground in all the borings. Odors were very strong inside the bermed area at Boring DM-6 but less noticeable at DM-4 and DM-5.

## 4. Site 11 - Fuel Hydrant System Leak/Spill Area

Several thousands of gallons of jet fuel were spilled in the 1950s at Site 11. Three borings (DM-1, DM-2, and DM-3) were drilled at the site along a line extending southwest from the flight line, midway between fuel hydrants 3 and 4 (Plate 7). Boring DM-1 is about 100 feet from the edge of the taxiway, and Borings DM-2 and DM-3 are at 50-foot intervals from DM-1.

The ground surface at Site 11 consists of sparse grass and brown fine sandy silt. The silt extended to the termination depth of 10.5 feet in DM-2 and to 9.6 feet in DM-3 except for a 1.5-foot sand layer at 7 feet below ground in DM-3. Basalt was encountered at 2.6 feet in DM-1, although it is unknown whether it was a large boulder or bedrock.

HNU readings from the borehole ranged from less than 1 to about 20 ppm, although no odors were detected. The moisture content of the soil samples ranged from 2.2 to 15 percent.

#### 5. Site 12 - Entomology Shop Yard

Site 12 is the driveway area adjacent to the northwest side of the entomology shop (Building 2206). Borings DM-7, DM-8, and DM-9 were drilled at 10-foot intervals in a line perpendicular to the building (Plate 8).

The soil at Site 12 consisted of brown, fine sandy silt with trace clay and gravel to a depth of 2.5 to 5 feet below ground, underlain by brown, silty fine sand to the completion depth of all the borings (6.5 feet). A single HNU reading of 80 ppm was noted at a depth of about 1 foot in DM-9. All the other readings were 5 or less, and no unusual odors were detected. Moisture contents ranged from 4.6 to 14 percent.

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#### E. HISTORIC GROUND WATER PROBLEMS

Ground water in the vicinity of Mountain Home AFB provides water for domestic use and irrigation. However, steadily declining water levels may decrease the availability of ground water in the future.

As discussed previously, ground water is currently mined at a rate of about 600 ac-ft/yr, and the overdraft would increase to 28,108 ac-ft/yr when all the outstanding ground water permits for irrigation are developed. If all the ground water applications currently pending are developed, the overdraft would be about 48,000 ac-ft/yr (Norton et al., 1982).

The overdrafts have caused constantly declining ground water levels in the vicinity of the base. Water level records are available from one well immediately northwest of the base (4S-5E-19CBA1) and two wells located about a mile east of the base (4S-5E-25BBC1 and 4S-5E-24AAB1) (Young, 1977; Norton et al., 1982). Water levels in all three wells have declined between 2 and 4 feet per year since 1967. Since 1976, ground water levels have declined as much as 45 feet in an area immediately east of the base (Norton et al., 1982).

Both state and federal agencies have responded to the declining water levels in the Snake River Basin. On May 7, 1981, the Idaho Department of Water Resources designated a 128-square-mile area about 6 miles north of the base as the Cinder Cone Butte critical ground water area (CGWA). Ground water levels in that area declined as much as 35 feet between 1976 and 1981 (Norton et al., 1982).

#### F. LOCATIONS OF WELLS ON AND OFF BASE

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Drilling logs and well construction information were collected for the base production wells and for private wells located within 2 miles of the base. Plate 2 shows the locations of the base wells and private wells, and they are summarized in Tables 2 and 3, respectively. The sources of the well information included logs filed with the Idaho Department of Water Resources, Young (1977), Norton et al. (1982), and Parliman (1982).

The private well inventory consisted of 35 wells located within a radius of 2 miles of the base. The wells ranged in depth from about 400 to 735 feet and are used for either domestic or irrigation water supplies. Generally a 6-to 20-inch diameter borehole was drilled and up to about 25 feet of surface casing was installed. Most of the wells were completed as open holes below the surface casing, and only the largest production wells were cased or screened to the bottom of the borehole. The water level at installation ranged from 300 to 400 feet below ground. Pumping test results were available for only four wells, which yielded specific

capacities of 24 to and 412 gpm/ft. The wells were completed primarily in black or red basalt, presumably from the Bruneau Formation.

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There are currently seven base wells in operation, and MH-8 was under construction. The wells range in depth between 400 and 610 feet and were installed periodically since 1943. The borehole for the wells ranged from 8 to 24 inches, and the entire length of the borehole was cased. A portion of the casing was perforated either at the factory or in the field with a torch. Water levels at installation ranged from about 309 to 331 feet below ground. Current water levels are listed in Table 7 and range from 320 to 368 feet below ground.

TABLE 7

WATER QUALITY PARAMETERS MEASURED IN THE FIELD

Well	Sampling Date	рH	Specific Conductivity (µmhos/cm)	Temperature	Casing Volumes Pumped	Depth to Water (feet)
MW-1	11 Apr 84	7.95	1300	14	6	332.9
MW-2	11 Apr 84	8.48	210	18	5.5	353.6
MH-1	10 Apr 84	7.91	600	18	6	336
MH-3	10 Apr 84	7.80	1700	16	18	354
MH-4	10 Apr 84	8.19	350	16	6	335
MH-5	10 Apr 84	8.19	770	16	3	not accessible
MH-6	10 Apr 84	8.46	300	19	3	368
MH-7	10 Apr 84	8.22	330	17	6	320
East Lagoon	11 Apr 84	7.87	680	10	-	-
West Lagoon	11 Apr 84	9.46	500	10	-	-

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## III. FIELD PROGRAM

#### A. DEVELOPMENT

The field program was developed based on previous phases of the IRP. During Phase I, the sites at which hazardous materials were handled were identified, and the sites with the highest potential environmental impact were selected. A field program to confirm the site selections was then developed in Phase I and evaluated during the Phase II Presurvey.

The Phase II, Stage 1 program consisted of the following activities:

- 1. Installation and sampling of a monitor well at Site 1, the lagoon landfill, and one at Site 2, the "B" Street landfill.
- 2. Sampling of base supply wells MH-1, MH-3, MH-4, MH-5, MH-6, and MH-7.
- 3. Drilling, geologically logging, and sampling three borings at Site 8, three borings at Site 11, and three borings at Site 12 to depths of between 2.7 and 10.5 feet.

4. Sampling the east and west wastewater lagoons.

#### B. IMPLEMENTATION

## 1. Monitor Well\_Installation

The monitor wells were drilled by Elsing Drilling, Inc. from Twin Falls, Idaho using air-rotary techniques. Initially, a 12-inch boring was drilled to 49 feet, and 50 feet of 8-5/8-inch steel surface casing was cemented into the borehole. An 8-inch borehole was then drilled to the completion depth. Cutting samples were collected at 5-foot intervals and logged in the field by an experienced Dames & Moore geohydrologist. Air exhausted from the borehole was monitored for organic and explosive vapors using an HNU photoionization detector and an explosimeter. At Site 1, cuttings from MW-1 were collected in 55-gallon drums or loaded onto the back of a truck and placed in a plastic-lined trench near MW-2 at Site 2. Cuttings from MW-2 were discharged directly into a plastic-lined pit, and both piles of cuttings were covered with a plastic sheet following completion of the drilling. The cuttings did not appear to contain hazardous constituents based on visual inspection and low-level readings on the photoionization detector.

The well casing consisted of 4-inch diameter Schedule 80 PVC pipe and well screen with 0.040-inch machine-cut slots. Construction details are listed in Table 8. The casing and screen sections were connected with threaded joints to avoid using PVC solvent. Pea gravel was placed with a tremie pipe within the annulus of the borehole up to about 10 feet above the top of the screen. About 9 feet of sand with grain sizes falling between sieve sizes #8 and #120 and about 2 feet of bentonite pellets were placed on top of the pea gravel to prevent grout from invading the gravel pack. The remaining annular space was filled with a cement grout (MW-2) or two intervals of grout separated by an interval of pea gravel (MW-1). The monitor well installations were completed with a concrete pad, PVC slip-cap on the well casings, and a steel lockable cap on the surface casing. MW-1 was completed at ground surface to allow for vehicular traffic on the dike.

The wells were developed by air-lift pumping until the discharge was clear of sand. MW-1 yielded about 60 gallons per minute (gpm), and MW-2 yielded about 15 gpm. These yields were measured by directing the discharge to a location where the flow was measured with a bucket and timer. The discharge from both wells cleared up after less than an hour of pumping.

#### 2. Monitor Well Sampling

Prior to sampling, at least three casing volumes of water were bailed from each monitor well using a PVC bailer. The PVC bailer was double rinsed with distilled water prior to bailing each well. The sample jars were filled using a Teflon bailer after the specific conductance and pH of bailed water had stabilized. The Teflon bailer was double rinsed with distilled water and was then single rinsed with well water prior to bailing the samples. The samples were placed in an insulated cooler with ice and delivered to the analytical laboratory, UBTL Inc. in Salt Lake City, within 24 hours of sampling. Table 9 lists the parameters and preservatives.

Measurements of the depth to water, pH, specific conductance, and temperature were taken in the field and are listed in Table 7. The depth to water was measured with an electric tape. Measurements of pH and temperature were made with a Hach Model 19000 temperature-compensated digital pH meter equipped with a combination electrode. The meter was calibrated using pH 7 and 10 buffers. Specific conductance measurements were made with a Markson Science Model 10-B temperature-compensated conductivity meter and are reported at 25°C. The portion of the sample to be analyzed for metals was filtered through a 0.45-micron membrane in the field with a barrel-shaped pressure filter.

TABLE 8

MONITOR WELL CONSTRUCTION DETAILS

Item	MW – 1	MW-2
Depth of borehole (feet below ground)	402	410
Screened interval	321 to 381*	344 to 404
Gravel pack	310 to 401	316 to 410
Fine sand seal	301 to 310	304 to 316
Bentonite seal	299 to 301	302 to 304
Cement grout	252 to 299 0 to 173	0 to 302
Gravel and sand fill	173 to 252	None
North state plane coordinate (estimated)	503,700	509,800
East state plane coordinate (estimated)	462,400	442,300
Ground surface elevation (estimated)	2990	3010
Depth to water (11 Apr 84)	332.9	353.6

<sup>\*</sup>Non-slotted PVC pipe was installed from 381 to 401 feet in order to locate the screened interval across the water table.

TABLE 9

PARAMETERS AND PRESERVATIVES FOR WATER AND SOIL ANALYSES

Parameter	Preservative	Container <sup>a</sup>	Maximum Holding Time	Sample Volume (ml)	Analytical Method <sup>b</sup>
	Ground	d Water Sample	es		
Oil and grease	Cool H <sub>2</sub> SO <sub>4</sub> or HC1 to pH<2	G	24 hours	1,000	EPA 413.2
Metals	Filter on-site HNO <sub>3</sub> to pHK2	P,G	6 months	250	EPA 206.2 (arsenic) EPA 213.1 (cadmium) EPA 218.2 (chromium) EPA 220.1 (copper) EPA 239.2 (lead) EPA 245.1 (mercury) EPA 249.2 (nickel) EPA 270.2 (selenium) EPA 272.1 (silver) EPA 289.1 (zinc)
Phenol	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH<2	G	28 days	1,000	EPA 420.2
Pesticides	Cool, 4°C	G, Teflon cap	7 days	1,000	EPA 608
Total organic carbon	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> or HCl to pH<2	G	28 days	25	EPA 415.1
Total organic halogens	Cool, 4°C	G, Teflon cap	24 hours	40	EPA 9020
	S	oil Samples			
Oil and grease	Freeze	G	none	500g	EPA 413.2
Total organic carbon	Freeze	G	none	500g	EPA 415.1
Total organic halogens	Freeze	G	none	500g	EPA 9020
Phenol	Freeze	G	none	500g	EPA 420.2
Pesticides	Freeze	G	none	500g	EPA 608
Metals	Freeze	G	none	500g	EPA 206.2 (arsenic) EPA 213.1 (cadmium) EPA 218.2 (chromium) EPA 220.1 (copper) EPA 239.2 (lead) EPA 245.1 (mercury) EPA 249.2 (nickel) EPA 270.2 (selenium) EPA 272.1 (silver) EPA 289.1 (zinc)

aG = Glass, P = Plastic

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bFrom Methods for Chemical Analysis of Water and Wastes (USEPA, 1978); Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (USEPA, 1982); and Test Methods for Evaluating Solid Waste (USEPA, 1982).

# 3. Base Well Sampling

Base wells MH-1, MH-3, MH-4, MH-5, MH-6, and MH-7 were sampled during Phase II, Stage 1. Prior to sampling, the depth to water was measured, where possible, with the built-in air line and direct reading gauge. The pump was then started and samples were collected after at least three casing volumes had been discharged from the well. The sample bottles were filled from a spigot on the discharge line. Measurements of pH, specific conductance, and temperature are listed in Table 7. The sample bottles were placed in an insulated cooler with ice and delivered by air freight to UBTL within 24 hours of sampling. MH-7 was sampled in place of MH-2, which was inoperative.

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# 4. Wastewater Lagoon Sampling

Grab samples from the east and west wastewater lagoons were collected in a large plastic container and then poured into the individual sample bottles. The sample bottles were placed in an insulated cooler with ice and delivered by air freight to UBTL within 24 hours of sampling. Measurements of pH, specific conductance, and temperature were made in the field as described above and are listed in Table 7.

# 5. Collection of Soil Samples

Soil borings were drilled by Erickson-Ford Company of Boise, Idaho, using hollow-stem auger techniques. The borings were drilled to the sampling depth using the augers, and the sample was collected using the Dames & Moore Type "U" splitbarrel sampler. The sampler was driven 18 inches or to refusal with a 140-pound hammer, and the soil sample was retained in 2.5-inch diameter by 1-inch brass rings. A portion of the soil retained in each of the brass rings was scraped into the The brass rings were cleaned with detergent, water, and acetone sample jar. between samples, and the sampler parts and hollow-stem augers were cleaned with soap and hot water between borings. The soil samples were placed in an insulated cooler with ice and delivered to UBTL within 72 hours after sampling. boreholes were backfilled with powdered bentonite to within a foot of the ground surface. The remainder of the boreholes was filled with concrete along with a small round steel marker attached to a 3-foot piece of rebar. Organic or explosive vapors emanating from the boreholes were measured at each sampling interval with an HNU photoionization detector and an explosimeter. The measurements are listed on the boring logs in Appendix A. The soil samples that yielded the highest readings were subsequently submitted for analysis in quantities prescribed by the scope of work.

## IV. DISCUSSION OF RESULTS AND SIGNIFICANCE OF FINDINGS

#### A. DISCUSSION OF RESULTS

This section presents a discussion of the chemical analyses of ground water and soil samples collected during field investigations at the sites shown in Plate 2. The second part of this section discusses the significance of the results.

The standards with which the results of the chemical analyses are compared are the primary drinking water standards.

# 1. Site 1 - Lagoon Landfill

The field investigation at Site 1 consisted of installing and sampling a monitor well and sampling the east and west lagoons. The field investigation is described in Section 3.0, and the complete analyses are presented in Appendices B and D.

The parameters detected in the monitor well (MW-1) sample included lead, cadmium, TOX, and TOC. The lead concentration met, but the cadmium concentrations exceeded the primary drinking water standards. Although there are no standards for TOX and TOC, the concentrations of those parameters were low (see Table 10). Despite the low concentration of TOX, it is higher than background suggested by the levels in the base wells, and it indicates that some halogenated wastes may be present in the ground water. Because none of the pesticides were detected in MW-1, the organic halogens may include chlorinated solvents, which have been used at the base.

Heptachlor, delta-BHC, and silver were detected in the east lagoon sample, and TOX, TOC, and oil and grease were detected in both the lagoon samples. Standards exist only for silver, and the concentration found in the east lagoon is below that standard. The TOX concentrations in the lagoons were elevated well above the background levels suggested by the base wells.

#### 2. Site 2 - "B" Street Landfill

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The field investigation at Site 2 consisted of installing and sampling the monitor well (MW-2). The field investigation is described in Section 3.0, and the complete analyses are presented in Appendices B and D.

The only detectable parameter in the MW-2 sample was TOX, which is present at a level that is equivalent to the background levels found in base water wells (see Table 10).

TABLE 10

SUMMARY OF CONSTITUENTS ABOVE DETECTION LIMITS IN GROUND WATER AND LAGOON WATER ANALYSES

	Monitor	Well			Base	Base Well			West	East
Constituent	MW-1 MW-2	MW-2	<u>M</u> Ξ-1	MH-3	MH-4	MH-5	9-HM	MH-7	Lagoon	Lagoon
Pesticides (µg/L)										
Heptachlor	QN	QN	NA	NA	NA	NA	NA	NA	QN	0.007
delta-BHC	ND	ND	A A	NA	NA	NA	NA	NA	ND	0.08
Metals (µg/L)										
Lead	10	ND	NA	NA	NA	NA	NA	NA	QN	ND
Cadmium	20	QN	NA	NA	NA	NA	NA	NA	Q	QN
Silver	ND	ND	NA	NA	NA	NA	NA	NA	ND	10
Others (mg/L)										
TOX	0.12	0.055	0.082	0.12	0.065	0.086	0.059	0.062	1.5	1.9
TOC	4.0	ND	2.0	0.9	ND	2.0	ND	QN	20.	53.
Oil & Grease	ND	ND	0.5	ND	ND	ND	N Q	ND	1.6	7.4
Phenol	ND	Q <b>N</b>	NA	NA	NA	NA	NA	NA	QN	QN

# Notes:

- (1) Those constituents not listed above were present at concentrations less than detection
- (2) Table 1 lists all the constituents analyzed, detection limits, and water quality criteria. (3) ND = None detected; NA = Not analyzed

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# 3. Results of Base Well Sampling

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Ground water samples were collected and analyzed from six base wells: MH-1, MH-3, MH-4, MH-5, MH-6, and VH-7. The base wells are located throughout the base, as shown in Plate 2. Sampling methods are given in Section III, and the complete analyses are listed in Appendix D.

Base well samples were analyzed for TOX, TOC, and oil and grease. TOX was detected in all six base well samples, TOC in three samples, and oil and grease in one base well sample (see Table 10). No water quality criteria have been established for these parameters, although all were present at low concentrations. The TOX concentrations ranged from 0.059 to 0.12 mg/L, with well VH-3 being the highest of the six wells. In the other five wells, TOX ranged from 0.059 to 0.086 mg/L.

# 4. Reliability of the Ground Water and Surface Water Analyses

The ground water quality analyses are considered to be reliable by virtue of the well construction and sampling measures taken in the field to insure that the samples were representative; by virtue of quality control procedures in the laboratory; and because of the monitor well locations.

The monitor wells were screened above and below the water table where low density organic contaminants would be concentrated. After the monitor wells were installed, they were thoroughly developed by air-lift pumping to remove all effects of drilling and installation and to improve the flow of ground water into the wells. Pumping was continued until the specific conductance of the well water stabilized and the discharge was clear of sediment. At least three casing volumes of water were removed from the monitor wells and the base wells prior to sampling to insure that the samples were representative of ground water in the formation. The monitor well samples were collected with a Teflon bailer to minimize agitation and consequent aeration of the sample, which could volatilize organic chemicals. The Teflon bailer does not absorb any chemicals from the sample and, therefore, prevents any adverse affects of sample chemistry and cross-contamination of subsequent samples.

The monitor wells were installed at locations where they would most likely intercept contaminants from the two waste sites. MW-1 was installed in a dike between the east and west lagoons, which coincides with the approximate center of the former landfill. Based on available site hydrogeologic data, MW-2 was installed at a location thought to be downgradient from the "B" Street landfill. However, it is possible that the ground water gradient may have been altered due to pumping of base wells.

The laboratory quality control (QC) program is described in detail in Appendix B. In general, analyses of duplicate and spiked samples were satisfactory. Analyses of method blanks were also acceptable.

#### 5. Background Concentrations

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No historic background concentrations of organic parameters or pesticides are available for ground water beneath Mountain Home AFB, but some information exists for concentrations of inorganic constituents. Ground water used at the base is obtained from the Bruneau Formation. As discussed in Section II.C, ground water quality in that formation has deteriorated somewhat since about 1960. The ground water quality prior to 1960 is approximated by the concentrations listed in Table 5, which are based on analyses of MH-3 samples prior to 1958. Current background conditions are shown by the analyses in Table 4, which are based on samples from MH-1, MH-3, MH-5, and MH-6 obtained in 1980. Despite the deterioration. concentrations of all the constituents from all the wells, except MH-3, meet the primary and secondary drinking water standards. Concentrations of nitrate-nitrogen and total dissolved solids in MH-3 samples exceed the primary and secondary drinking water standards.

No historic analyses of the organic content of ground water beneath the base were available, and the absence of any water quality criteria for TOX and TOC precludes any regulatory basis for comparing the concentrations obtained from water and soil samples. However, the following information provides some basis for interpreting the quality of water and soil indicated by TOX and TOC measurements.

TOC is a measure of the organic carbon in a sample, regardless of whether the source is natural or man-made. Organic carbon in uncontaminated ground water is derived from humic and fulvic acids dissolved from sediments, dissolution of carbonates containing organic carbon, and other dissolved organic materials. Background concentrations are typically less than 10 mg/L, especially in an aquifer such as the Snake River Plain aquifer, in which ground water would be relatively aerated and oxidizing conditions probably prevail. In an aquifer in which there is little ground water movement, organic-rich aquifer material, and relatively anaerobic or reducing conditions, TOC concentrations could be expected to range up to 100 mg/L. Industrial wastes may contain as much as 200,000 mg/L, and consequently, highly contaminated ground water may yield any concentration including several thousand milligrams per liter of TOC.

All soils contain varying fractions of organic materials that, in turn, contain different concentrations of organic carbon. The organic carbon analyses for the Mountain Home samples were performed on soil slurried with water and analyzed using the TOC methodology (USEPA Method 415.1) for water. No TOC methodology for solid samples has been approved by USEPA to date. The Mountain Home soil analyses will be evaluated only on a relative basis, especially because no background samples were specified by the Phase II, Stage 1 scope of work.

TOX is a measure of organic halogens containing chlorine, bromine, and iodine that can be adsorbed by activated carbon. The same methodology (USEPA Method 9020) was used for both soil and water analyses. A water extract was taken from the soil samples according to USEPA methods (USEPA, 1982). Chlorinated and brominated organic chemicals are not naturally produced, but are manufactured chemicals such as pesticides, PCBs, PBBs, and solvents. Therefore, virtually any concentration of TOX is an indication of organic contamination.

#### B. SIGNIFICANCE OF FINDINGS

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Based on the results described in the previous section, this section will estimate, to the degree possible, the extent of contamination at each site and the risk to human health, if any, that the contamination poses.

# 1. Extent of Contamination at Site 1 - Lagoon Landfill

The ground water analyses from Site 1 show evidence of organic contamination. The concentration of TOC is probably at background levels, but the TOX concentration, approximately 50 percent higher than background from base wells, indicates that some contamination has occurred. Although the cadmium concentration in the MW-1 sample exceeded the primary drinking water standard, it is unlikely that it represents contamination by base activities. The insignificant concentrations of lead, chromium, and other inorganic constituents, which may indicate inorganic contamination, suggests that the cadmium is from a natural source or is a laboratory error. Unfortunately, no other cadmium analyses could be located from area wells for comparison. Resampling and analysis for cadmium is warranted. The extent of ground water contamination beneath Site 1 cannot be estimated from one well.

The presence of elevated heptachlor, delta-BHC, TOX, and TOC in the lagoon samples indicates that organic contaminants are present in the lagoons. The oil and grease in the lagoon samples may account for most of the TOC, and the detected pesticides and solvents may be the source of the TOX. Because of the high TOX concentrations and the presence of two pesticides, the lagoons may be the source of the contaminants that are responsible for the organic halogens detected in the MW-1 sample.

# 2. Extent of Contamination at Site 2 - "B" Street Landfill

TOX was detected in concentrations equal to the background levels found in the base supply wells. However, it is not known whether MW-2 was actually installed downgradient of the landfill, since localized changes in the water table may have occurred due to base well pumping.

## 3. Extent of Contamination Indicated by Base Well Samples

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The TOX concentrations in the base well (and monitor well) samples indicate that some halogenated organic compounds are present in ground water beneath the entire base. The concentrations ranged from 0.059 to 0.086 mg/L in all the base well samples except MH-3, which contained 0.12 mg/L. In contrast, the TOC concentrations are too low to indicate conclusively the presence of contaminants. The magnitude of the contamination is difficult to evaluate because many different organic compounds contribute to TOX, and each compound has its own degree of health risk.

The highest TOX concentrations were in the MH-3 and monitor well samples. MH-3 has a history of deteriorating water quality (see Section II.C) due to additions of inorganic salts infiltrating downward from surface sources or migrating upward from the Glenns Ferry Formation. The presence of organic contaminants in the MH-3 sample indicates that there may be a pathway for contaminants to travel from the ground surface to the water table. The existence of a pathway is also suggested by the relatively high TOX concentrations in the monitor well samples. Contaminants may be infiltrating from the "B" Street landfill, lagoons, the former lagoon landfill, road salting, or irrigation.

The Phase II, Stage 1 results suggest that base waste disposal areas are the source of the organic contaminants, although there may also be off-base sources. The sample from MH-6, which is approximately upgradient of all the waste disposal areas, contained 0.059 mg/L of TOX, slightly less than the downgradient sample from MH-5 (0.086 mg/L). The MH-6 sample also contained the lowest concentration of TOX of all the samples. These observations suggest that organic contaminants are being added to ground water as it passes beneath the base. However, the halogenated compounds in the VIH-6 sample may have originated from pesticides, herbicides, solvents, or other organic chemicals used north of the base, although until local ground water flow directions beneath the base are better known, it is conceivable that contaminants from the "B" Street landfill could be intercepted by MH-6. The regional ground water flow direction is south, but local variations would be created when the base wells are in operation. Identification of the individual organic compounds will also help to determine whether base or off-base sources are responsible for the observed contamination.

# 4. Extent of Contamination at Site 8 - Existing Fire Department Training Area

Site 8 is the existing fire department training area where jet fuel is currently burned for fire training exercises. The results of the soil analyses are listed in Table 11.

Phenol and lead concentrations were relatively uniform, but there was wide variation among the concentrations of TOX, TOC, and oil and grease. The variation is due to the unpredictable mixture of the combustion products of waste fuel, oils, lubricants, and jet fuel that has accumulated. However, the concentrations of all three parameters generally decrease with depth. Oil and grease and TOC appear to be at background levels at about 7.5 feet. The background value for TOX is unknown, but a comparison of the TOX concentrations from Site 11 and Site 8 soil samples indicate that the maximum background concentration is probably about 250 micrograms per liter (µg/L). On this basis, the TOX measurements at 7.5 to 9 feet in DM-5 do not indicate any contamination, although contamination may be present at 9 to 10.5 feet in Boring DM-6. Boring DM-6 was drilled within the bermed area in which jet fuel pools before it is burned during fire training exercises and, consequently, yielded the highest degree of contamination compared with samples from the other two borings.

The extent of contamination appears to be concentrated in the upper 7.5 feet of soil, except beneath the bermed area, where it extends more than 10.5 feet below the ground surface. It is not possible at this time to estimate how much deeper the contamination may extend beneath the bermed area.

The threat to human health posed by contaminants at Site 8 is low under normal conditions. These contaminants enter the human body principally through inhalation, either as vapor or as particulate matter in aerosols. Under dust-free conditions and short-term exposures to the site, the degree of hazard is diminished by the volatility of the contaminants. Dispersion of the contaminants in the atmosphere would maintain a low degree of hazard. When exposure times amount to several hours or direct contact with site materials is necessary, the degree of hazard rises proportionately, and the threat to human health can only be evaluated by direct measurements of organic and explosive vapors. The degree of hazard would also be much greater under dusty conditions for any exposure time.

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SUMMARY OF CONSTITUENTS ABOVE DETECTION LIMITS IN SOIL ANALYSES

Lead (µg/q)		33	39	54	27	13		28	41	37	25	56	41
Phenol (µq/q)		22	2	2	2	Ð		¥	¥	¥	ş	¥	¥
Oil & Grease (mq/q)		29 8.0	. 19	0.48	0.09	2		2	2	0.08	2	2	0.10
10C (mg/g)		11, 2.4	6.6	0.27	3.9	0.12		3.5	0.93	0.72	3.9	5.6	0.65
10χ <b>a</b> (μg/L)		670 790	890	250	4,700	490		310	400	250	250	570	099
Moisture Content (%)		8.4 10	8.4	6.9	12	3.0		14	2.2	10	14	15	10
Sample Depth (ft)		0 - 1.5 4.5 - 6	1.5 - 3	7.5 - 9	3 - 4.5	9 - 10.5		0 - 1.5	1.5 - 2.5	3 - 4.5	9 - 10.5	1.5 - 3	4.5 - 6
Sample Number		T 4	- 2	9	~	7		7	2	~	7	2	4
Boring Number	Site 8	DM-4	DM-5		DM-6		Site 11	DM-1		DM-2		DM-3	

	Chlordane		2	⟨1p	2	2	2	2
	Lindane		2	2	2	2	0.05	0.01
(no/t)c	Heptachlor Epoxide		2	2	2	2	0.07	2
Pesticides (	Endrin		2	2	2	0.03	9	2
-	Dieldrin		0.03	0.09	90.0	0.09	0.07	0,01
	000		0.09	0.64	1.3	1.3	0.03	2
	P, p' -001		2	2	2.4	2	2	2
Moisture	Content (%)		8.1	14	13	13	4.6	9.0
Sample	Depth (ft)		0 - 0.5	0.5 - 1	0 - 0.5	0.5 - 1	0 - 0.5	0.5 - 1
	Sample Number		-	2	_	2	-	2
	Boring Number	Site 12	DM-7		DM-8		0M-9	

aConcentration in water extract.

Detection limit raised because of interferences.

\*Concentration in EP toxicity test extract of soil samples.

(1) Concentrations are on a wet weight or as received basis. (2) ND = none detected; NA = not analyzed Notes:

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# 5. Extent of Contamination at Site 11 - Fuel Hydrant System Leak/Spill Area

Two jet fuel spills occurred at Site 11 in the late 1950s. Table 11 lists the contaminants that were detected in the soil samples from Site 11.

TOX concentrations ranged up to 660  $\mu g/L$ , and TOC concentrations ranged up to 5.6 milligrams per gram (mg/g) in soil samples from Site 11. Lead concentrations were relatively uniform, ranging from 25 to 41 micrograms per gram ( $\mu g/g$ ). Oil and grease was detected in only two samples and in insignificant concentrations. Concentrations of all three parameters generally decreased with depth. Shallow soil samples probably contain trace amounts of organic contaminants remaining from the jet fuel spills, although the low concentrations represent little or no significant contamination.

The threat to human health posed by contaminants at Site 11 is insignificant. Under normal conditions, the site is isolated by the flight line and apron, so there is little reason for any exposure to the site. However, under dusty conditions or when direct contact with site materials is necessary, the degree of hazard will rise slightly.

# 6. Extent of Contamination at Site 12 - Entomology Shop Yard

Site 12 is the entomology shop yard where pesticides and rinse water containing pesticides were drained. Analyses of soil samples obtained at Site 12 are listed in Table 11.

Of the 16 pesticides in the analyses, seven were detected in EP toxicity test extractions of one or more soil samples from Site 12. The detected pesticides included p,p'-DDT, DDD, dieldrin, endrin, heptachlor epoxide, lindane, and chlordane. The concentrations range up to 2.4  $\mu g/L$  of p,p'-DDT, although most of the concentrations were less than 0.1  $\mu g/L$ . Dieldrin was detected in all six samples, while DDD was detected in five of the six samples, and the remaining five pesticides were detected in one or two samples each. The concentrations for endrin and lindane were far below the RCRA standard for EP toxicity (40 CFR 261.24).

The extent of contamination extends at least 1 foot below ground surface and includes the area in the vicinity of the borings, the furthest of which is located 30 feet northwest of the entomology shop (Building No. 2206). It is unknown how deep the pesticides may be present because only the upper 1 foot of soil was analyzed.

The threat to human health posed by pesticides at Site 12 is very low under normal conditions. The pesticides could be expected to enter the human body

principally through inhalation or as particulate matter attached to aerosols. Under dust-free conditions, the degree of hazard is diminished because the pesticides are typically strongly absorbed by soil particles. Under dusty conditions or when direct contact with the shop yard soil is necessary, the degree of hazard rises proportionately, and protection such as particulate filters or gloves may be advised.

## V. ALTERNATIVE MEASURES AND CONCLUSIONS

#### A. ALTERNATIVE MEASURES

This section describes several alternatives for further investigating the existence of ground water contamination at Mountain Home AFB. The alternatives include annual sampling of the base wells and monitor wells, additional soil sampling at Sites 8 and 12, and other ground water investigation techniques.

The results of Phase II, Stage 1, along with existing information, revealed evidence of organic ground water contamination. However, neither the magnitude of the contamination nor the sources of the contaminants can be properly evaluated without knowing the individual organic compounds that contributed to the observed TOX concentrations. All the operating base wells and monitor wells could be resampled and analyzed for the organic parameters in USEPA Methods 601, 602, and These parameters include the halogenated compounds for which there are 608. USEPA-validated analytical methodologies. The samples could also be analyzed for all the major cations and anions to accurately assess the ground water quality beneath the base. Tracing the changes in composition of ground water from different areas beneath the base would show the effects of mixing of various waters, and would indicate the impacts of the various base facilities and disposal areas on ground water quality. One or more of the anions such as chloride or sulfate may serve as an accurate contamination indicator. The cations, along with the anions, generally define a "fingerprint" of a particular ground water type that can be recognized among different samples. Comparison of the ground water analyses can also show the occurrence of mixing of ground water from the Bruneau and Glenns Ferry Formations or the addition of contaminants to the ground water system from the lagoons.

The sources of the observed organic contamination are difficult to identify without detailed knowledge of the ground water surface beneath the base. Although the regional gradient is south, local variations, which would affect the directions of contaminant migration, are created when the base wells are in operation. When the base wells and monitor wells are resampled, ground water levels could be measured and carefully converted to elevations. To accomplish this, the monitor well and base well elevations would have to be surveyed, and the depths to water in the base wells would have to be accurately converted to elevations. Installation of monitor wells to determined background conditions should be deferred until after confirmation of Phase II, Stage 1 results and definition of local gradients based on surveyed water levels.

Soil samples from Site 8 contained the highest concentrations of contaminants of all three sites. Samples from Boring DM-6, which was drilled within the bermed area, yielded contaminants at depths of 9 to 10.5 feet. Two additional borings could be drilled within the bermed area at Site 8 to define the vertical extent of contamination. Soil samples could be collected at 2-foot intervals until there is no visual or olfactory evidence of contamination. The presence of contaminants could also be detected using a photoionization detector, and the boring could be continued until the sample yields background readings. Two samples from each hole, the deepest sample in which contamination is suspected and the sample in which no contamination was detected, would be submitted for analysis of volatile and semivolatile organics, oil and grease, and moisture content. In order to better evaluate these analyses, a third boring could be drilled in a nearby area in which no fire training has ever been conducted. This boring would be drilled to the depth at which no contamination was detected beneath the bermed area, and four samples would be submitted for analyses of the same parameters as the samples from the fire training area. Results of the soil analyses would be used to define the vertical extent and magnitude of soil contamination at Site 8.

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Soil samples from Site 12 yielded evidence of low-level pesticide contamination, which could pose a potential health hazard under dusty conditions because of the vehicular traffic and human activities in the vicinity of Building 2206. Although four soil samples each were collected from Borings DM-7, DM-8, and DM-9, only the two samples from 0 to 1 foot were analyzed for pesticides. In order to determine the vertical and areal extent of the pesticide contamination, additional borings located adjacent to Building 2206 could be drilled and sampled.

Borehole geophysical methods such as resistivity, self potential, density, and gamma radiation are often used to characterize geologic and hydrologic conditions. However, they would not yield significantly more subsurface information than that collected during the drilling and sampling carried out for Phase II. Like surficial geophysical methods, borehole methods yield the most information from sediments with contrasting properties such as composition, grain size, moisture content, density, or degree of consolidation. However, the severity of fracturing, which provides an indication of the ability of contaminants to migrate through the basalt, can be measured with geophysical techniques. This information would be useful when deciding whether a particular site is contributing contaminants to ground water.

Unsaturated zone monitoring is a method of investigation that is used to characterize the quality of water in the soil pores above the water table. The sample is collected in a lysimeter that is buried at some depth beneath the area of investigation. A lysimeter is a porous ceramic container with separate sampling vacuum hoses attached to it. Soil water is collected by evacuating the lysimeter

and then pressuring it to retrieve the sample. If the soil moisture content is low, up to several days may be required for soil water to seep into the lysimeter. Lysimeters are useful because they provide samples of downward infiltrating water before it reaches the water table. They can also be used to isolate sources of ground water contamination. Their usefulness at Mountain Home AFB is diminished because of the low soil moisture content.

#### B. CONCLUSIONS

This section contains a summary of the conclusions reached after completion of Phase II, Stage 1. Recommendations for the next phase of IRP are given in the following paragraphs, and attendant costs are presented under separate cover in Appendix J.

Mountain Home AFB is located on the Mountain Home Plateau about 10 miles southwest of the city of Mountain Home. The Mountain Home Plateau is a rolling upland plain with occasional volcanic cones or buttes rising several tens to a few hundred feet above the plain. The plateau is underlain by over 10,000 feet of volcanic and sedimentary rock, of which the important formations are, in ascending order, the Idavada volcanics, the Glenns Ferry Formation, and the Bruneau Formation. Ground water occurs in all of the formations underlying the plateau, although the principal source of ground water for the base is the Bruneau Formation.

Seventeen sites were identified within the base at which hazardous wastes were either handled or disposed of. The purpose of Phase II, Stage 1 was to investigate five of these sites selected through HARM rating in the Phase I study and to determine the extent of environmental contamination. The Phase II, Stage 1 field program consisted of soil sampling at three of the sites, installation and sampling of a monitor well at each of the remaining two sites, and the sampling of six base wells and two wastewater lagoons.

Evidence of organic ground water contamination was indicated by the analyses of samples from MW-1 and one base well. Of the inorganic parameters, only cadmium in the MW-1 sample exceeded the primary drinking water standard, although the absence of other trace metals suggests that the cadmium is from a natural source rather than from base activities. The well should be resampled and analyzed for cadmium. Concentrations of TOX were highest in the MW-1 and MH-3 samples (0.12 mg/L) and were relatively uniform in the remaining base well samples (0.055 to 0.086 mg/L). Although there are indications that the waste disposal areas are the sources of the organics, there also may be an off-base, upgradient source for the contaminants. The extent of contamination includes the western portion of the base, but the magnitude cannot be estimated without knowing the individual compounds

that contributed to the TOX concentrations and their corresponding health risks. TOC concentrations were too low to conclusively indicate either background or contaminated conditions. Traces of two pesticides were detected in the lagoon samples, along with high concentrations of TOX, suggesting that the lagoons or the former landfill underlying the lagoon may have a detrimental effect on the underlying ground water.

Evidence of soil contamination was found as deep as 10.5 feet beneath Site 8, which is the existing fire department training area. The most persistent contamination was found beneath the bermed area in which jet fuel is pooled before it is burned during the fire training exercises. The presence of contamination was shown by relatively high TOX and TOC concentrations. Samples from Borings DM-4 and DM-5, which were drilled outside the bermed areas, contained background concentrations of TOC and TOX at depths of 7.5 to 9 feet. However, evidence of contamination was present in the deepest sample from Boring DM-6, which was drilled inside the bermed area, and it is not possible to estimate how much deeper the contamination may extend.

TOX and TOC analyses of soil samples from Site 11 indicate that little, if any, contamination remains from the jet fuel that was spilled in the late 1950s. Shallow soil samples contained trace amounts of organic contaminants, although the low concentrations represent little or no significant contamination.

Site 12 is the entomology shop yard where pesticides and rinse water containing pesticides were drained. Of the 16 pesticides in the analyses, seven were detected in EP toxicity extractions from one or more soil samples at concentrations up to 2.4  $\mu g/L$ , although most of the concentrations were less than 0.1  $\mu g/L$ . Dieldrin and DDD were detected in most or all of the samples. The results of the pesticide analysis must be studied in light of the poor recoveries on spiked soil samples. Table B-2 in Appendix B shows recovery rates between 40 and less than 10 percent on the soil samples. These poor recovery rates indicate that pesticide concentrations may be an order of magnitude higher than those reported. These adjusted concentrations do not appear to cause any human health risk, because the original values are low.

The threat to human health posed by contaminants at Sites 8, 11, and 12 varies with each site. The health risk at Site 11 is insignificant because of the isolated location and low concentrations of contaminants in the soil. At Site 8, the health risk is low except when dusty conditions prevail, when exposure times amount to several hours, or when direct contact with site materials is necessary. The health risk at Site 12 is judged to be extremely low and insignificant.

# VI. RECOMMENDATIONS

The recommendations presented in this section have five primary purposes:

- 1. Identify those sites where further action is deemed warranted;
- 2. Confirm and identify the organic contaminants in ground water beneath the base;
- 3. Further investigate the depth of suspected soil contamination at Site 8;
- 4. Aid in identifying the sources of the contaminants; and
- 5. Verify cadmium results.

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Various alternative measures for achieving these purposes, along with a detailed discussion of the information that would be obtained, are presented in Section V. The following are our recommendations for sites requiring no further action and sites warranting further investigation.

#### A. SITES WHERE FURTHER ACTIONS ARE DEEMED UNWARRANTED

No indication of residual fuel was found in our investigation of Site 11. The actual amount of fuel that was lost is not known, nor is the percentage that washed away with surface flow. It has been indicated that as much spilled fuel as possible was pumped out of the area (CH2M Hill, 1983). In the 25 years or more since the fuel spillage and leakage occurred, it is probable that the last fuel has evaporated or decayed by biochemical transformation. It is highly unlikely that any fuel that entered basalt could now be found and recovered. Based on the results of sampling and analysis of soils, it is recommended that Site 11, the fuel hydrant system leak/spill area, not be considered for further actions.

The results of chemical analyses of EP toxicity test extracts of soil samples from Site 12, the entomology shop yard, have been analyzed taking into consideration the poor recoveries on spiked soil samples. The pesticide quantities are estimated to be in the range where there is little threat to human health. It is recommended that this site not be considered for further investigation.

#### B. SITES WARRANTING FURTHER INVESTIGATION

It is recommended that an accurate water level survey of all the base wells and the two monitor wells be conducted in order to define the local ground water flow directions. To accomplish this, the monitor well elevations must be surveyed, and the depth to water in the base wells and monitor wells must be carefully measured and accurately converted to elevation. The resulting elevations will help

to evaluate the direction of migration of contaminants beneath the base and enable a more accurate placement of additional monitor wells and background wells. After completion of the survey, it is recommended that four monitor wells be installed at Site 1, one upgradient and three downgradient. The results of the water level survey should be studied to determine whether MW-2 at Site 2 was placed downgradient of the landfill. If MW-2 is downgradient of the landfill, no further action should be taken at this site. If MW-2 is determined to be upgradient of the landfill, three additional monitor wells should be installed downgradient. If it cannot be determined whether MW-2 is upgradient or downgradient, install one upgradient monitor well and three downgradient monitor wells as defined by the water level survey.

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After installation of the monitor wells, it is recommended that ground water from the new wells, the two existing monitor wells (MW-1 and MW-2), operating base wells (MH-1, MH-3, and MH-5), and the two lagoons be resampled and analyzed for pH, specific conductance, major cations and anions, and the organic parameters in USEPA Methods 601 and 602 (Table 12). These parameters will characterize the organic content of the ground water and lagoon contents and will identify the compounds that contributed the organic halogens observed in the Phase II, Stage 1 analyses. Resampling is necessary to confirm the presence of organic contamination indicated by TOX concentrations in Phase II, Stage 1 and to identify the individual compounds that contributed to the TOX. Identification of the compounds will help to determine the source of the contaminants and to assess the health risk associated with the contaminants.

It is also recommended that the depth of the contamination indicated at Site 8, the existing fire department training area, be determined. The purpose of the additional borings is to determine whether the hazardous materials at the fire training area have migrated deep enough to constitute a potential source of contamination of the ground water. Two borings would be drilled within the bermed area, and soil samples would be collected at 2-foot intervals until a photoionization detector measures background levels of organic vapors emanating from the samples. To confirm the absence of organic contaminants, the deepest two samples from each of the borings would be analyzed for volatile and semi-volatile organics, oil and grease, and moisture content. To aid in interpreting the results from these two borings, a third boring would be drilled at the periphery of the fire training area, which has not been affected by activities at the site. The background boring would be drilled to the same depth as the bermed area borings, and four samples from various depths would be analyzed for volatile and semi-volatile organics, oil and grease, and moisture content.

Other alternatives discussed previously are not justified at present, in our opinion, and are not recommended at this time.

TABLE 12

# PARAMETERS TO BE MEASURED FOR IRP PHASE II, STAGE 2 STUDY

EPA 601	EPA 602
Bromodichloromethane	Benzene
Bromoform	Chlorobenzene
Bromomethane	1,2-Dichlorobenzene
Carbon tetrachloride	1,3-Dichlorobenzene
Chlorobenzene	1,4-Dichlorobenzene
Chloroethane	Ethylbenzene
2-Chloroethylvinyl ether	Toluene
Chloroform	
Chloromethane	Major Cations
Dibromochloromethane	and Anions
1,2-Dichlorobenzene	
1,3-Dichlorobenzene	Calcium
1,4-Dichlorobenzene	Magnesium
Dichlorodifluoromethane	Potassium
1,1-Dichloroethane	Sodium
1,2-Dichloroethane	Sulfate
1,1-Dichl oethene	Chloride
trans-1,2-Dichloroethane	Fluoride
1,2-Dichloropropane	Bicarbonate
cis-1,3-Dichloropropene	Carbonate
trans-1,3-Dichloropropene	Nitrate Nitrogen
Methylene chloride	_
1,1,2,2-Tetrachloroethane	Others
Tetrachloroethene	
1,1,1-Trichloroethane	рН <sup>а</sup>
1,1,2-Trichloroethane	Specific conductivity
Trichloroethene	Cadmium
Trichlorofluoromethane	Water level <sup>b</sup>
Vinyl chloride	Temperature <sup>b</sup>

aIndicates measurement to be made in field and in laboratory.

bIndicates measurement to be made in field.

# APPENDIX A

LOGS OF MONITOR WELLS, BORINGS AND PRIVATE WELLS

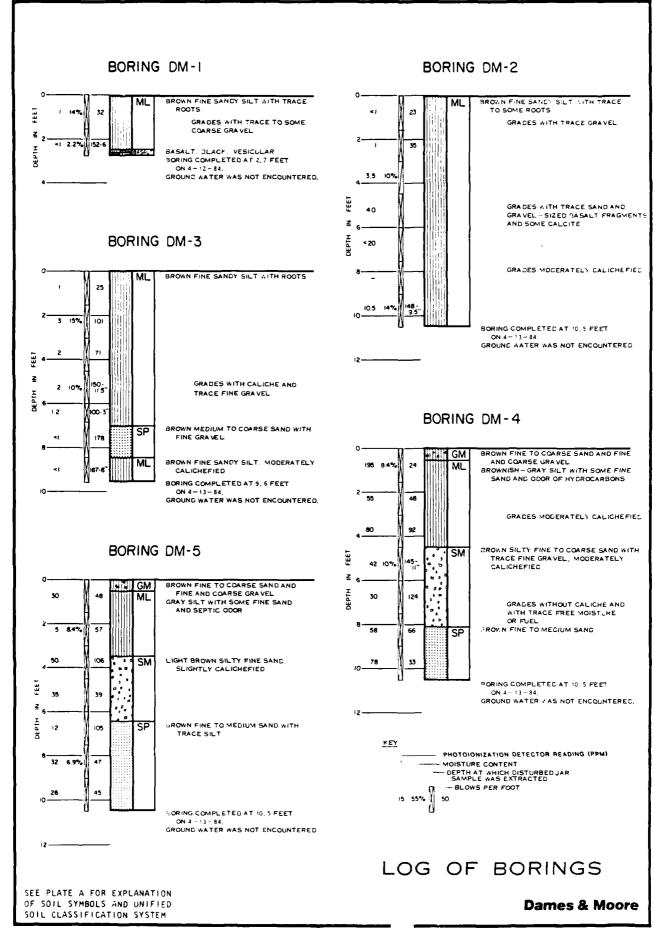
M	AJOR DIVIS	IONS	GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
	GRAVEL AND	CLEAN GRAVELS		GW	HELL-GRADED GRAVELS, GRAVEL- SAND WIXTURES, LITTLE ON NO FINES
CCARSE GRAINED	GRAVELLY SCILS	(LITTLE OR NO FINES)	* * *	GP	POURLY-GRADED GRAVELS, GRAVEL- SAND MIXTURES, LITTLE OR NO FINES
SOILS	MORE THAN 50% OF COARSE FRAC-	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL-SAND- SILT MIXTURES
	TION RETAINED ON NO.4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL-SAND- CLAY MIXTURES
	SAND AND	CLEAN SAND (LITTLE		sw	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS	SANDY SOILS	OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
LARGER THAN NO. 200 SIEVE SIZE	ARGER THAN NO. 100 STEVE SIZE WORE THAN 50% OF COARSE FRACTION PASSING NO. 4 STEVE	SANDS WITH FINES - (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				sc	CLAYEY SANDS, SAND-CLAY MIXTURES
		LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SIGHT PLASTICITY
FINE GRAINED SOILS	SILTS AND CLAYS				CL
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	AL IS AND LIQUID LIMIT	LIQUID LIMIT		мн	INCRGANIC SILTS, MICACEGUS CR DIATOMACEGUS FINE SAND GR SILTY SOILS
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE				СН	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		**		ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
+	IGHLY CRGANIC 501	LS		PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SUIL GLASSIFICATIONS.

SOIL CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION SYSTEM

Dames & Moore



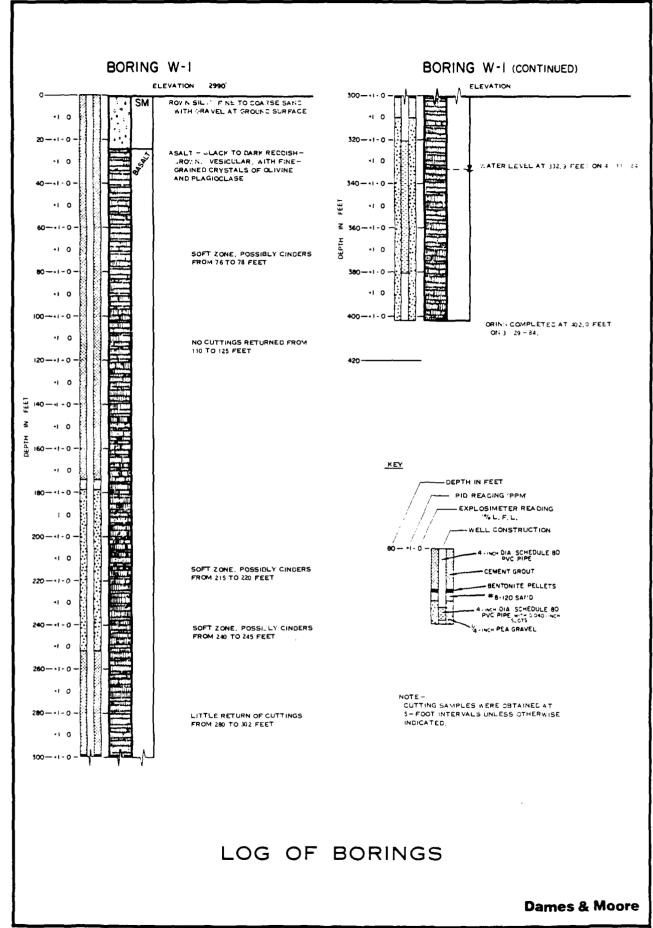
# BORING DM-6 BORING DM-7 BROWN FINE TO COARSE SAND AND FINE AND COARSE GRAVEL -GRAY SILT FITH SOME FINE SAND AND BROWN FINE SANDY SILT AITH TRACE CLAY AND TRACE GRAVEL 22 150 ML SEPTIC OCOR 5-LIGHT GRAY SILTY FINE SAND. MODERATELY CALICHEFIED AND GRADES WITH SOME GRAVEL 170 12% SM 50 SEPTIC OCOR ROWN SILTY FINE SAND WITH TRACE 50 BORING COMPLETED AT 10.5 FEET 86 SP ROWN FINE AND MEDIUM SAND WITH GROUND MATER MAS NOT ENCOUNTERED. TRACE SILT 70 44 32 BORING DM-9 BORING COMPLETED AT 10, 5 FEET ON 4-13-84, GROUND WATER WAS NOT ENCOUNTERED. BROWN FINE SANDY SILT WITH TRACE GRADES WITHOUT GRAVEL BORING DM-8 BROWN FINE SANDY SILT WITH TRACE CLAY AND TRACE GRAVEL BROWN SILTY FINE SAND, SLIGHTLY CALICHERIED BORING COMPLETED AT 4,5 FEET SM BROWN SILTY FINE SAND ON 4 - 14 - 84, GROUND WATER MAS NOT ENCOUNTERED. BORING COMPLETED AT 6,5 FEET ON 4-14-84. GROUND WATER WAS NOT ENCOUNTERED.

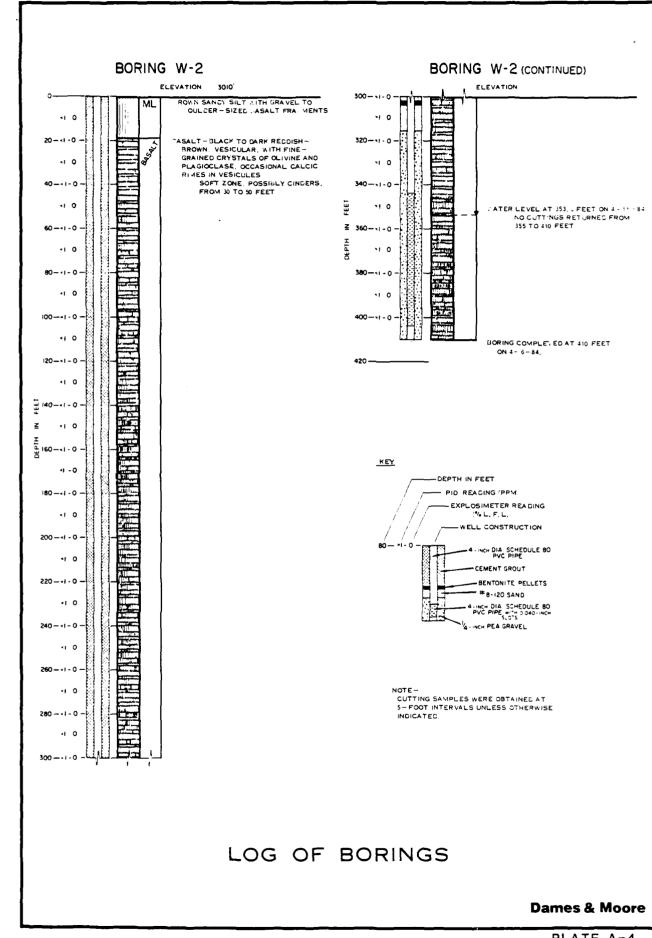
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LOG OF BORINGS

**Dames & Moore** 



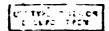


# CUPIED FRUIN DATE FROM A.F.B. USAF WELL ! (OLD) BY ROLSTON 9-14-67

State law : equired that this report shall be filed with the State Beclassiion relater within 30 days after completion or chesicanses of the well.

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	or ofe Pump? [5] Bail
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New well Despend   Abandoned	Longth of time of test: Fre, His.  Draudous: 2' ft. Artesian pressure: ft.
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No. X size of gravel Gravel	ZCZ REO CLAY
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Durners of hets 16 inches Total depth 604 feet			320	ASLA perc plack pu	14		
Caumperint School CE Small CD Concrete		377	3-5	red coarde cirdere Eard bloom bessle			
Thurse Commer From To		1 772	14.4	THE A STORY OF A THE			
175 E. m. 16 inches + otice for 200 fort		3:3	1356 1	VETT LIE. 1			
let'de   lenthes   fest   fect   fe		35.				_	
inches lect lest lest	$\vdash$	326		Since & Territor			
Inches feetfeet							
Vice on pelos dos consists 12 Vm 12 Vm	16	300	-10	ecuisa coun A gra			
Vicinity per first sector CF Yes S No. Professors  CFYes C No.		410		recular count for niver with clay	<u> </u>		
Humperforce: AC Factory   C Knile   C Toron Size of perforation		140	. 55 1	FROM DOOR CORATA A.	·	. <u> '</u>	
Size of perforation 3/25 Inches by 3 Inches			1 1	cley (Sint of the Line	) <u> </u>		
1.750 performine 337 feet 400 feet		516	£15	very bard over the	· }		
parf-retions feet feet		543	575	Year land limit on		البوات	
primations feet feet		575	540	tlack base of a second	را يم بهجد	<u> </u>	
WUT server in inventional?   ☐ Yes    © No		5:0	55C _1	talada ilmaditi eletini	· · · · · · ·	٠. ب	
Richald Large rome	-	5.00	-02	Cinfor and	<del></del> :.	<del>vide</del>	
Type Middal Mo. Disrvetor C'ut alre Set from font to fout				ATTENDED TO THE OWNER OF THE OWNER OWN			
Dismeter Set size Set from feet to feet		502	1204	mariah sasit t	. بغشنست		
		<del>                                     </del>			<del></del>	<del></del>	
Gravel packed? Yes 12 No Size of gravel							
					<del></del>	<del></del> : .	
Earling and Comp. 22 Millarld and in seed. (F Committee great		-				-	
O Publishe they O No. 1 cent to						•••	
Backy process and C Stary IN C Temporary action (1994)						٠	
Constant to seed deput					•	٠.	
& LOCATION OF WOLL	7.	ork sta	rud 9./	17/74 100000			
Si cuth man last in an moral agree with written incestion.							
6/	u r	ya 166	9 £ :7.	Ter or		/	
				District State of the State of	· • · · ·	( ,	
Service Erra							
		₹95 <b>%</b> .	3000 1	Bergan kan di di dan dan dan dan dan dan dan dan dan dan			
_				<i>y</i> , *			
المناسل المناسل		apred by	(Pro (	स्ता <b>डह</b> ां च्या			
County			Par.	- 1/1 / A	•		
FR K B NAME 23 T. 4 2 T. B . W						• •	
The second section of the section of the se	1425.3		M2 W W	THE CLASSICAN	بردن د هم <del>وه</del> مین درجید مدرد		
man and the companies of the companies o	6 (Table)	THE C	<b>~</b> ₹ 14	T Price of the said of the said	_		

SEFORT OF 16	
Ingineer within 30 days after completion or a	<del></del>
Mana Manatan Home AFB # 2	Sime of drilled hole: / 7." Total Septh of wil: / 7/7   Standing water Level below ground: 7/4   Sump. Fabr.   Toot delivery: 7/7   300 or
Microso MT. Heart Tolako	Pake. Shot delivery 750 886
elemtian 2993 may	orefs Pump? [X Bail]
Owner's Permit No. MATURE OF WORK (check): heplacement well	
Nov well . Despend . Abandened .	length of time of toot:
Vater to to be used for: damastic use.	above land surface - Give flow - ofe
METROD OF COMSTRUCTION: Betary Gable Dug Other	or gps. Shutoff processro: Controlled by: Valve Gap 71ug
(Ama) (Alla)	No control   Door well look around coning?
guantam from a ft. to 1/2g tt.	DEFTE MATRIAL WATER
"Dies. frosft. toft.	PROM TO THE OR HO
"Diag. fromft. toft.	a 12 Black basalt No
"Diam. from ft. to ft. "Diam. from ft. to ft. "Diam. from ft. to ft. Thickness of easing: Material:	30 100 Black & arry basalt Ne
Steel 🖸 concrete 🔲 wood 🗋 ether 🔲	HIB 788 BURNED Chy- red cinder Ide
(explain)	a blue state
PERFORATED? Yes No Type of	
perforator wed:	Corred From AFB date
Size of perforations:	Clus # M#260: 2725 - C5
perforations from 279 ft. to 339 ft.	9-14-67 1 L C,
perforations fromft. toft.	
Size of perforations:  perforations from 279 ft. to 459 ft.  perforations from 379 ft. to 425 ft.  perforations from ft. to 6t.  perforations from ft. to ft.  WAS SCREEN INSTALLED? Fee	
Manufacturer's sage	
Dias. Slot size Set free ft. to ft.	
Type   Rodel No. Diam. Slot size   Set free   ft. to   ft. Diam. Slot size   Set free   ft. to   ft. CONSTRUCTION: Noll gravel marked? Yes	
CONSTRUCTION: Well gravel packed? Tes	
placed from ft. to ft. Surface seal	
No.   eise of gravel   Gravel   placed from   ft. to   ft. Surface seal   provided?   Yes   No   To what depth?   ft.   Material used in seal:	
Did any strata contain unusable water? Yes	
No. Type of water: Depth of strataft. Nethed of scaling	
Depth of strataft. Method of scaling strata off:	
	<del>                                     </del>
Surface casing weed? Yes No	
Cemented in place? Yes	
Locate well in section	
<del> </del> <del> </del>	Work started:
	Work finished: /0 /4/ 53 Well Driller's Statement: This well was
Bos, 2/	drilled under my supervision and this report
	is true to the best of my knowledge.
<b></b>	Address:
	Signed by:
IOCATION OF WILL COMMEN #Comme	Missass No Date:

[A-7]

Toe other side for additional remarks

USSS

## State of Idaho

State law requires that this report shall be filed with the State Resignation before within 30 days after completion or characters of the call.

Property the second and the second second the second secon

MELL CORRES:  Race MT Home AFB # 3	Size of drilled hole: /2" Sould sopth of well: //2 " Hamilag unter level below ground: 330" Resp.  Tahr. Sout delivery: 750 mm or ofe Pump! ( Bail
Address MT House Idaha	hevel below ground: 330' Some.
	orefc Pump? [2] Bail Sinc of pump and motor wood to make toot:
MATURE OF WORK (check): Benlagement well	tough of time of tost: frog Ris.
Water is to be used for: domestic	Dreviews: 0 ft. Artesian presents: ft. above land surface tive flow efs
NETHOD OF CONSTRUCTION: Rotary Gable Z	or gm. Shutoff woodere: Controlled by: Valve Gap Ving
CASING SCHEDULE: Threeded Wolded	Controlled by: Valve   Cap   Ying
Than. fromft. toft.	THE OF HO
"Diam. from ft. to ft.	VIST PET
flickness of casing:	Hala Copul from
Steel _ concrete _ wood _ ether _	AFB data 7.14.67
(explain)	
PERFORATED? Tes He Type of perforator used:	
Size of perforations:  perforations from ft. to ft.	
perforations fromft. toft.	
perforations from ft. to ft. perforations from ft. to ft. perforations from ft. to ft. WAS SCREEN INSTALLED? You   No	
WAS SCHEEN INSTALLED? You	
WAS SCIENCE INSTALLED TOO NO. NO. NO. NO. NO. NO. NO. NO. NO. N	
Diam. Slot size Set free ft. to ft.	
COMSTRUCTION: Well gravel packed? Yes	
size of gravel Gravel placed from fi. to ft. Surface seal provided? Tes 50 To what depth?	
ft. Material meed in seal:	
Did any strata contain unusable unter? Yes	
No Type of water:ft. Nothed of sealing	
strate off:	
Surface casing used? Yes Ho	
<del>-</del>	
Locate well in section	
	Vork stafted: Vork finished:
See 027	Well Driller's Statement: This well was
	drilled under my supervision and this report is true to the best of my knowledge.
<b></b>	Address:
	Stanet by
LOCATION OF WELL: County	Licease No No. Let
LOCATION OF WELL: County Sie NE > 800, 279, 4 1/8 1, 5 14	lises

## WELL LOG AND REPORT TO THE STATE RECLAMATION ENGINEER OF IDAHO - LV

summ 5 Solid Casing below 50. est of well \_april 20, 1955... Date of open

RECLAMATION ENGINEER OF IDAHO	West A	<b></b>	
		·	<b>N</b>
	•	<u> </u>	80 H07 FLL 80
val Harden	Addaus	Boise, Idaho	
Joining waver	ower of Air Base	الا : حده ۱۱	Elmer Com
	us 6/4 hoa		
Meda 24.4	Total day	pt of Wes 378"	<u>, , , , , , , , , , , , , , , , , , , </u>
	308° 9° w	Noter Temp.	
tion test 1500	Inve	rted come of w	281' 9"a
1500	·		
and maker used to make t	he tee Supply from wa	ter tower and	ndens m_281' 9"A Soutling flow me
and maker used to make t	·	ter tower and	ndens m_281' 9"A Soutling flow me
pumped during check we give flow in c.f.s	he tee Supply from wa	ter tower and	Spurling flow me
pumped during check we give flow in c.f.s	he tee Supply from wa	ter tower and	Spurling flow me
pumped during shock we give flow in c.f.s	ho too Supply from wa	CA BO	Spurling flow me
indestroy was1500 and easer cood to make to pumped during check we have flow in affac, describe control works, the set for, he could be, he could be, he could be, he could be, he could be	ho too Supply from wa a 81 hours or gas pupply weight	LET 1 200 F ADD	281' 9" a specific flow me
indestroy was1500 and easer cood to make to pumped during check we have flow in affac, describe control works, the set for, he could be, he could be, he could be, he could be, he could be	ho too Supply from wa	LET 1 200 F ADD	281' 9" a specific flow me
purpose 1500 pumpos was 1500 pumpos deving shock was been been as the control weeks.  I describe control weeks.  I describe control weeks.  I describe control weeks.	he test Supply from wa a 61 hours  or gas  from wa  from wa  or gas  from  from wa  from wa  from  fr	ALAN ONE OF VALVE. ST. of cooling per Brook fact.	onurling flow me to be promote the promote to promote the promote
purpose	Puply Coding at 18" 1. D. 178'	PE AND DIES OF VALVE. ST.  of cooling per Broom foot.  At a c l  and the cooling per Broom foot.  At a c l  and the cooling per Broom foot.  At a c l  and the cooling per Broom foot.  At a c l  and the cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.	281' 7"A  Sparling flow me  to b process  To pounds  To boltom  To process  To boltom  To process  To boltom
purpose	ho too Supply from wa a 81 hours or gas pupply weight	PE AND DIES OF VALVE. ST.  of cooling per Broom foot.  At a c l  and the cooling per Broom foot.  At a c l  and the cooling per Broom foot.  At a c l  and the cooling per Broom foot.  At a c l  and the cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.  And cooling per Broom foot.	281' 9"a Courling flow me of in pressure 75 pounds 75 pounds 75 pounds 75 pounds 75 pounds 75 pounds 75 pounds 75 pounds 75 pounds 75 pounds
purposed during check we purposed during check we be clear	Puply Coding at 18" 1. D. 178'	AND CORRECT ONLY OF CONTRACT OF CONTRACT ON CONTRACT O	281' 9" and some state of the second

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CASING RECORD 37816" 37816" Upen bottom

		MEIT 100	D-21	ing Tinse	7.2	-1
from fee	To had	Type of Material	Mrs.	Min.		3
0, 0	" 19'	Top soil and yellow clay subsoil				
19'	21	Grey basalt medium hard				
21	42	Grey basalt very hard and dense		i		<b></b>
42	50	Grey basalt streaks of red	L	<u>J</u>		
50	59	Grey basalt, creviced, medium hard	<u></u>	<u> </u>		
59	90	Greyish red basalt, crevices, med. hard	hard		<u> </u>	
90	103	Grey basalt, very hard		•		
103	105	Grey basalt, reddish streaks	• -			
106	109	Grey basalt, with layers of cinders				
109	110	Grey vesicular basalt				
110	114	Grey basalt with cinder filled crevices			!	
114	120	Grey basalt, creviced			1	
120	139	Grey basalt with phenocrystals of diorite?	; e · · ·			
139	172	Reddish grey basalt and cinder layers	1.0	į		
172	174	Reddish grey basalt and gravelly clay		]		
174	185	reddish grey basalt	Ž	•		
185	190	Cinders				
190	204	Reddish grey basalt		 		
		If more space is required use Sheet No. 2		<del> </del>		

### WELL DRILLERS STATEMENT

This well was drilled under my jurisdiction and the	above informa	stion is true and correct to the best of my knowledg
and belief	Signed	Card Hacker
	•	

Oned /1/4 c. 1. 1 10 56

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Ucense Na. 1\_\_\_\_

### SHEET NO. 2

Well Drille Orval Barden

Well Lecution Mt. Home Air Bas

		WELL LOG				_
From Fort	To Peri	Type of Material	Drillin			
		Mrs.	Min.	12.1	٠,٢	
204 '	240'	Grey basalt		· · · · · · · · · · · · · · · · · · ·		
40	247	Reddish grey basalt				
247	280	Grey basalt				
80	290	Stringers of reddish grey basalt and lava	tuff?			
90	320	Grey basalt, extra large crevice at 293'				
320	326	Grey basalt, very hard				
326	338	Cemented red cinders				
38	378'6"	Grey basalt, creviced 340 to 351				
		" 364 to 378				
irst v	water end	countered at 342', static water level 309'	8"			
n orde	er to mak	of drilling was from 3' to 10' of crooked he straight hole it was necessary to use over	er one ton			_
or dyna	amite to	shoot the walls straight. Every known met	hod of dril	1100		
traigh 11 fo	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers of	avail.	_		
traigh 11 fo	ht hole w rmation l material	with the use of cable tools was tried to no ay at a high angle with alternate layers of	avail.	_		
traigh	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers of	avail.	_		
traigh	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers of	avail.	_		
traigh	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers of	avail.	_		
traigh	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers of	avail.	_		
traigh 11 fo	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers of	avail.	_		
traigh 11 fo	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers or the second second second second second second second second second second second second second second second second second second se	avail.	_		
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traigh 11 fo	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers or the second second second second second second second second second second second second second second second second second second se	avail.	-		
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straigh Ul foi	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers or the second second second second second second second second second second second second second second second second second second se	avail.	-		
straigh Ul foi	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers or the second second second second second second second second second second second second second second second second second second se	avail.	-		
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traigh	rmation l	with the use of cable tools was tried to no ay at a high angle with alternate layers or the second second second second second second second second second second second second second second second second second second se	avail.	-		

THE REPORT OF THE PROPERTY OF

## REPORT OF WELL DRILLER State of Idaho

State law requires that this report shall be filed with the State Boeladation beginner within 30 days after completion or abandonment of the well.

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WELL OWNER: Band usafa 3 # 5	Size of drilled hole: 2 depth of well: 42 Standing	otal water
_ , ,	level below ground: 326 Test	peps
	orcfn Pump?Bail	
Owner's Permit No.	Size of pump and motor used to ma	ke test:
HATURE OF WORK (check): Replacement well How well Despensed Abandoned	ength of time of test:Hrs	. Min.
Water is to be used for:	Drawdown: ft. Artesian press	ure: ft.
METEOD OF CONSTRUCTION: Rotary Cable V	above land surface Give flow	cra
Dug Other (explain)	Controlled by Valve Cap	Plug
(explain) CASING SCHEDULE: Threaded Welded	controlled by Valve Cap No control Does well leak are DEPTH HATERIAL	und casing?
CASING SCREDULE: Threaded Welded  "Diam. from ft. to ft.  Thickness of casing: Material:  Steel concrete wood other	DEPTH HATERIAL	WATER
"Diam. from ft. to ft.		YES OR NC
"Diam. from ft. to ft.	PEET FEZT	No.
Thickness of casing: Naterial:	0 14 Tepsei/ 26 258 kese/t	<del></del>
Steel C appearate C wood C other C	258 262 baked clay	
Steel C compared C control C	162 277 FORSILIFEROUS CLOU	
(explain)	277 330 brown rock (hard) 330 348 Acoun Rock	Yes
(explain) PER-ORATED? Yes No Type of perforator used:	48 393   F1954 Ved basa/1	7:3
	191 398 Bentonie 398 411 Gray Sheli 411 422 broken beralt	Ne_
Size of perforations: "by	411 was bout	Ne Ne
perforations fromft. toft.		
perforations fromft. toft.		7-/
perforations from ft. to ft.	copied from US. C.S.	<del>le le d</del>
Size of perforations:  perforations from ft. to ft.  VAS SCREEN IRSTALLED? Fee No	5-21-47 216	
METRIFICIAL & DEEA		
Type Model No.  Diam. Slot size Set from ft. to ft.  Diam. Slot size Set from ft. to ft.		
Dias. Slat size Set from ft. to ft.		
COMSTRUCTION: Well gravel packed? Yes		
No. size of gravel Gravel placed from ft. to ft. Surface seal		<del></del>
provided? Yes No To what depth?		
ft. Material used in seal:		
	<del></del>	<del></del>
Did any strate contain unusable water? Yes		
No. Type of water: Depth of stretaft. Method of sealing		
strate off		<del></del> }
Surface casing used? Yes No.	<del></del>	
Cemented in place? Yes No	<del></del>	
Locate well in section		
	<del></del>	
		<del></del>
	fork started /ys ?	
	Well Driller's Statement This wa	<del></del>
Sec	irilled under my supervision and	
,	is true to the best of my knowled	ige.
<b>.</b>	Nage	<del></del>
•	Address	<del></del>
	Signed by 4/C	<del></del> _
LOCATION OF WELL County	License No. Date	
B = 8 300 0 € 7. 4 € 5 8. 5 € Å		
Use other side for	additional remarks	<b>c</b> :
And After add 10L	editional remerae USG	. 5

[A-12]

COM TAXABLE COCCOCC TOSTANDE

TO CONTRACT TO CON

## CUDIED FROM A.F.B. DOTA BY RALSTUN 9-14-67

Zeden

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State law requires that this report shall be filed with the State Reclassics Inglacer within 30 days after completion or absolutes of the will.

MANNE MOUNTAIN HUME A.F.B. #6	Also of the	rilled hele: 20" roll: 6/0 Sta re ground: 347 Toot Colivery els Pump! 2 Bai	Sotal adiag unter
Address Mana Tala Home	level bela Febr.	Toot Gallvery	700p.
X	97	efo Pump? 🔯 Bai	1
Owner's Fermit No. HATURE OF MORK (check): Meplacement well	C 607	involue Pimp	Not
Nov well Desposed Abandoned	Longth of	time of toot:	kro, Ka,
Vater is to be used for:	above lan	aurface Give	flowefe
NETHOD OF CONSTRUCTION: Betary [ Gable S	orgre	. Shutoff procesure	•
METHOD OF COMSTRUCTION: Betary Gable Cable Casuma Schedule: Through Market	No costro;	by: Valve   Cap   Dece well lead   MATERIAL	k eround coning?
CASING SCHEDULE: Threaded Velded   g   "Diam. from 0 ft. to 430 ft.  10"	Tes 📗	<b>To</b>	***
1 m // ' n			TES OR NO
"Diam. fromft. toft.	FRET FRET		
"Dias. from ft. to ft. "Dias. from ft. to ft. Thickness of casing: Material:	0 4	BROWN RUCE	Super CF
Steel X concrete  wood  sther		GREY LOVA	COT IN TUR
	49		200 10 10 10
(explain)		Back Lave - IR	
PERFORATED? Iss No perforator used:	75	Back Ass	
	57	CHELLOWN JEN	(25 Gr C)
Size of perforations: by perforations from 425 ft. to 6/0 ft.	92	Barai	
perforations from	135	BRUNGS RACL	Ove -
perforations fromft. toft.	145	KAD & ROCK L	AVA I
VAS SCREEN INSTALLED? You I No 🔀	95	BRIMA GEOL	<u> </u>
PARTIECTAREL'S BARR	205	KAD -BYA	
Type   Hodel No.  Diam. Slot size Set from ft. to ft.  Diam. Slot size Set from ft. to ft.	225	Back eve	Ava
DiamSlot simeSet fromft. toft.	233	Branch Love	
CONSTRUCTION: Well gravel packed? Yes	2(3)	GEO-010	
No. size of gravel Gravel placed from ft. to ft. Surface seal provided? Yes No To what depth?	289	RED & BLOCK L	ava
provided? Yes No To what depth?	105 105	Beace are	10. 10.
ft. Material used in seal:	246		2
Did any strata contain unusable water? Yes	1465	E BEL FULH	<del></del>
No. Type of water: Depth of strataft. Method of scaling	5.75	Hirt Kennelov	<u> </u>
etrata off:	385	SET ELLENS HOLE FLOWE BEIDE	NZH LOVO
	TA: -	CHERNAR COLL P	: 020
Surface casing used? Yes No.	441	GAR CINDRES LL	
Commented in place? You No	455	Mean her Land	21 Cultivaria)
Locate well in section	475	Lava Prace	
	5.3	Leo-ora	
	5=7	1.0.0.A -1.221A	
1 ' 1 ' 1	Work finis	hed:_	,
		er's Statement: Th	
ı x	is true to	Mor my supervision the best of my kno	and this report
	Name :		
	A44 PO 845 :	ર	
	Signed by:		
LOJATION OF WELL: County RE	License No	2010:	
NE . SE . 30c. 22 7. 4 N. B. E. R.	ļ	USG	6
Too other side for	additional	Property U.S.G.	•
• /	E , .	. ()	

560 Punc Lart & Sandarine 575 Course Great 610 Sonde Graves

Ferm 238.7 -

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STATE OF IDAHO
DEPARTMENT OF WATER RECOURCES

UNE TYPEWRITER OF

### WELL DRILLER'S REPORT

State law requires that this report by file. With the Director Department of Water Resources shiphin 30 days after the \_ noishin to rebands ment or the well.

the state of the s	ייאוי		-1 1111041			. 1 4 417	
1 WELL OWNER	,		ER LEV				
Name ,U S Air Force	ļ ,	Static	****		34.1 feer below to	r 1 surface	
Adverse Are, idens	ļ				AZ No GPM No		1
	Artesian convert in pressure 0.5.5. Constructed a Valve C Can Liz Plug						
Owner Cormit Nu 61-7224	Temperature 65 OF Quality						
2 NATURE OF WORK	•		. TEST	OAT	TA.		
New well Dragened AA Replacement		AXP.,	un ()		Bailer L Air ()	Other	
Abandoned (describe method of abandoning)					Pumping Lines	Hours Pu	mped
		179			379	2	
<u></u>	1	200	נינ	i	394	. 3	
3 PROPOSED USE						<u> </u>	
Domestic , Irrigation Test 👫 Munic pai		LITH	OLOGI	C LC	og .		
, Industrial - , Stock - 😅 Waste Disposal or Injection	Hole	De	pth		· · · · · · · · · · · · · · · · · · ·		Water
_ Other   facecify type:	Diam	From	Ťυ		Meterial		Yes No
4. METHOD DRILLED	20	10 11	1	to	pscil & chunks	of lava	┼ <del>┤┋</del> ┤
]	}		18 128		rdpan ry hard black_		
Rotary Air : Hydraulic Reverse rotary  Cable :: Dug :: Other			3.		om clay & ver		
Cable out out		1			black basalt _	<b></b>	<del>↓</del> _¦≛¦
5. WELL CONSTRUCTION	ŀ	31 50	50		ry bard black i ry broken redd		
Casinn schedule 12 Preet   12 Concrete   12 Other	1	30	52		ry broken redo		
Thomas Common from To	ļ	52		OF	y hard black b	sealt -	<del></del>
8 .280 inches 20 inches - 2 feet 18 feet	ł				treaks of sind		
.250 inches 16 inches 2 feet 480 feet	ł				ry-hard-black- rd reddish-bas		
inches inches feet feet inches inches feet feet	1	331	345	be	rd blook berel	<b>↓</b>	1
Was casing drive shoe used?   Yas XX No	}	345	350	₹•	<del>ry broken redd</del>	i <del>sh blac</del>	<b>*</b>
Was a packer or seel used? ☐ Yes 🐼 No	l	1.0		be	selt & cinders rd bleck besel		*
Perforated? All Yes II No	12	400	4495		fter broken bl		↓ <del>-</del>
Size of perforation 3 inches by 1/6 inches	} - ``	ł	i 1	ł	basalt		A
How perforated? AB i actory ☐ Knife ☐ Torch Size of perforation 3 inches by 1/8 inches Number 4.9480 perforations 340 from feet 480 test	ŀ	495	505	bl	ue oley & oind	• <del>••</del>	***
##### perforations 340 feet 400 feet perforations feet test	ĺ	1 .			·		
perforations feet teet oerforations feet feet		ł	•	-			<b>∤</b> → →
Well screen in L'ed? is Yes - 4-A-No	ł	t	: [				† - <del>†</del>
Menufacturer's name Model No.	-	1	•				
Diameter Slot size Set from feet to feet		ł	4 1	-			+
Diameter Stot size Set from feet to feet	-	ļ.	•	}			+-+-1
Gravel packed? ☐ YesA® No ☐ Size of gravel	_	1.					
Placed from feet to feet Surface seel depth 10 Material used in seel AS Coment grout	ļ		i - 4				<b>↓</b>
☐ Puddling clay ☐ Well cuttings		į	ļ .				╅╼╼╅╶┪
Seating procedure used			i 1				
Method of joining casing  Threaded  Welded  Solvens	1	ļ	] ]	_			1 1
Weld	l	Í	1 1		•		1 1 1
☐ Comented between strets  Describe # port ≥ pipe with threaded cap	10						
Describe a port 2. bibe with threaded dab		Wo	rk start	ted	9/30/82 tinune	2/11/8	3
4. LOCATION OF WELL	11	DRIL	_ERS	CER	TIFICATION		
Sketch map location must agree with written location	1				all minimus swell const		ros wers
Subdivision Name	ļ	comp	lied wit	n 81	the time the rig was remo	ved	i
		Film	Namid	.E.	Stevens & Son	em No 153	
w  = ' == ε	1		3 <b>4</b> -	20	и		_,
		Addra	ma 3/0	U <b>Y</b>	Hawthorn Driv	المعتامة	ا سـده
Lot No Black No	!	Signe	ı by (F	ırm (	Official (Correla	Enlin	~ /
	[	- •			1 / 1/	1.24	<u>-,</u>
County Elmore				Oue		Al Ar	zi '
M/m S/E ASm / 4 ASR 5 Fm						۱۱۱ عصر به وا	~~
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## USAF WELL #8

Norm 238-7

### STATE OF IDAHO CEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR SALLPOWIT PER

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**[**]

WELL DRILLER'S REPORT

State too requires that this report to filed with the Director, Department of Water R

					6.2	<u> </u>	41	⋍
1. WELL CHINER	7.	WATE	R LEV	EL		•		7
Name Hountain Home AFB Golf Course		Static	water k	~	363 ton salessia	er <del>statisti</del> er	ĥesou	rca
Addin 300 USU-USE	Flowing?   Yes   Chin   G.P.M. Rew   Artesian closed-in pressure   P.A.I.							-
	Controlled by:							1
Owner's Permit Neg 612-217	Temperature OF Quality Describe encount or temperature series below							긕
2. NATURE OF WORK	& WELL TEST DATA							
New well	l	Œ No	mp	0	Beller () Air ()	Other		- ]
mesonals, plug depthe, etc. in inhelegic log)	Olionorgo G.P.M.   Purmong Lines   Hours Po   750   370   1 htt.					-	$\exists$	
	L	1500			37"	il he.		コ
3. PROPOSED USE	$\Box$	1100			3/0	1 <del>2 nr</del>		ゴ
□ Demestic  trigation  □ Test □ Municipal	●.	LITH	DLOGH	cLC	)G	_		_
☐ Industrial ☐ Stack ☐ Weste Disposel or Injection ☐ Other		Prom			Manufal		4.1	
		1		v.	ri pan and broken	k	-	X
4. METHOD DRILLED	2	3	10	<u>بالانب</u> سور	oken rock and pour	TE TOO'		Ŷ
	25	10	82	<u> </u>	rus rock	- AVV		χ̈́
☐ Retary ☐ Air ☐ Hydraulic ☐ Reverse rotary	20	32	- <del>20</del> 1	<u> </u>	d cioders			Ŷ
CE Cable Dug Doher		90			ack solid rock		_	$\pm$
<u></u>					d ciodara (caving	`		
& WELL CONSTRUCTION	20	1111	1		ack solid rock	<del>/</del>	1	$\dot{\Box}$
	20	1115	105	<u> </u>	ack solld rock		$\vdash$	<b>,</b>
Casing schedule: D Steel D Concrete D Other	20	105	171		d colored cinders		$\vdash$ $\dashv$	1
Thisbons Dismotor From To	20	250	355	Re	cinders		$\vdash$	Ť
_250 Inches _20 Inches + _0 feet _10 feet	20	255	80	107	ack basalt		$\vdash$	Ī
Coming schedule: ID Steel   Concrete   Other	20	225	330	Ve	ry broken besalt	(caving)		X
_250 Inches 14 Inches plus2 feet 577 feet	20	330	37:	Bì	ack basalt		П	X
	22	775	787	Re	d cinders and bla	ck basalt	X	
Was exists drive shee used? □ Yes □ 3 No		332	435	٧e	ry hard solid bes	alt		T
Was a pasther or east used?   Ves.   A No.		435	475	Ā	oken basalt		X	
Perforated? ZZ Yes 🗆 No	20	475	500	\$0	oken basalt lid basalt		$\Box$	X_
How perforated? G Factory D Knife D Torch	13	500	506	So	lid basalt			X
Size of parteration $\frac{3/3}{3}$ inches by $\frac{3}{3}$ inches	2	506	508	Br	oken besalt and b	lack cinde		
Number From To	בנ	508	538	So	lid beselt		$\sqcup$	X.
1200 perforations 415 for 425 fort	13	539	540	81	ue clay		lack	ш
parterations feet feet feet feet			-	_			$\vdash$	$\blacksquare$
Well serven installed?   Yes   CE No							$\vdash$	ы
Manufacturer's come								-4
Manufacturer's name	$\vdash$					<u></u>	₩	
Classer Stat das Set from fact to fact	_		$\vdash$		<del> </del>		┿	-
	<b></b> -	├		_			┰	$\vdash$
Grand casked?   D Yes   Z No   D Size of grand	<b>—</b>		┝╼┵	_	<del></del>		╅	
Florad from feet to feet		$\vdash$	<del>                                     </del>		<del></del>		┰	<b>-</b> -1
Pleased from feet to feet to feet to feet to feet to feet to feet to feet feet	$\vdash$	<del>                                     </del>	<del></del>		<del></del>		$\vdash$	H
🖸 Bonsonto 💢 Puddling slay 💢		М	<del></del>	_			┪	
Scaling procedure wood: D Sturry pit D Tomp, surface cooling				_	7,000		1	rd
D Overbore to seel depth								
Method of joining easing:   Threaded   Welded   Solvent				_				
Web								
Commend between strets	*							
Describe seem part Through well cap	_	100	-	_	9/1/97	12/1/93		
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4. LOCATION OF WILL	11	DAIL		30	TIPICATION &L			1
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Shouth map leastlen mad agree with written leastlen.	1				all minimum useli quest ple time the rig use reme			~
Section Name	l							
	Ī	fire !	Name V	. •	Clevens & Sons P	tem No. 1 (1		1
			1					- 1
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barden Las No. Black No.	1				77			$\overline{z}$
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					. 1.7	777		)
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R/C . U/d					AND THE PARTY OF T	12 Sales		1
A/C w w/d were c/ T 4 Bon 2 sand	1							1

USE ADDITIONAL SHEETS IF NECESSARY - FORWARD THE WHITE COPY TO THE DEPARTMENT

REGERE

### Butto of Idaha Department of Resignation

### WELL DRILLER'S REPORT

Same has complete that the report to which 30 days after strengths		-	<b>**</b>	Nationalism Brights	27 3 .	
A start gamen	-	-		1 00 ml	4 42'	
Jack Streeter	- 2			375 test before land to the B.F.M. floor "F. Gentley		
Mountain Home, Tdaho	;					
Carry Paris No.	1		<del>dund</del> k	U Votes U Cop	n ===	
<b></b>	<u> </u>			U V 0 0 CO		
5 MYANE OF MOUNT		MELL TI	IST DA	TA		
2 Name and     Companied       Replessment				S Baller D Other		
D Atmospheric Schargers and advantages		4	DX	Brew Ownn	Name A	-
				+	┼	
2 Millions Att					<del></del> -	
C Summarie C Indigenium C) Test	1	LITHOL				
C Marriaged C Industrial C Street	=		Ta	بباستباة		W
A SETUDIO CONLLED		-9	- 4	Soil and lava t	a-ks	
		1	50	Soil and lava r Gray lava. Red clay and cu	vdes.	┼┼┤
El Cable   C. Russey   C. Dag   C. Other		52	60	Red Java		口口
S. WILL CONSTRUCTION	<u> </u>	68	78	Black lava.		╆╂
Objective of halo 10 inches Total depth 500 fort		7.8	100	Ano who lawa.		$\Box$
Curing submide:   Stand  Conserve		177	116	Gray Java Red claders		
Curing sphericks:     Shart     Consesse	<u> </u>	117	125	Ped Java Brown Java		╁╌╁╌┤
legion feat		1 14.7	160	Grav Java		$\Box$
	├	170	260	Lost mud. Brown lava.		╂┼┤
inches inches feet feet		1 2 <i>60</i> 1	302	Cray Jawa.		$\Box$
The a pather or end until		315	333	Brown clay. Gray lava.		<del>     </del>
Man parlament D Fastery D Knills D Torch		. 335	360	LOSE YANG.		$\Box$
The of purferagion instead by instead		1 380	405	Gray lava.		
Conder From To feet feet		1405	415	Brown lava. Brown cinders a	nd 61312	+
perfectionsfeetfeet		1 427	430	Brown lava.		$ \vec{x} $
		4 30	300	Mack lava.		<u> </u>
What compan installed?   O Yes   O He  Manufactures of a series		-				$\Box$
Typi- Medel No						$\Box$
*** Typis State Sta	-	├┤				┾┼┥
Grand parked? () Yes () No Size of grand						口口
Plant team feet to feet						
Surface and Fi Van     No To what depth						$\Box$
Material used in any 15 Comment grout 15 Pudding stay						
& LECATION OF WELL		لـــا				Щ
Shatch augs learden muz apres with written location.	144					l
<b></b>		fork sta	<b>w</b>	1/31/72 Related	70/-	
<mark>∤</mark>				RTIPICATION	ي	<b>Sec</b>
▎ <del>▐</del> ┣╼╪╾╏╼╪┱┥╸				ri i Piga i 1900 Had under my expercition a	nd this report	•
<del>                                    </del>	•			of my timesutedge.		
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Gourty Elso PA	7	are .	<u> </u>	×/ , , , , , , , , , , , , , , , , , , ,	- /·	<del></del>
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USS ASSITIONAL BUSTS IF NECESSARY

BALLING ITER GR

## State of Idaho Department of Water Administration

### WELL CRILLEN'S REPORT

State live requires that this repc./1 be filled with the State Reclamation Engineer within 30 days after completion or abandonment of the well,

	within 30 days after complet	no nci	abando	onment :				
1	will owner	7. 14	ATER	LEVEL	Z.			$\overline{}$
	Non- FITT MAY - PAGE   OF ZPA	معرا			× 0 1	4	•	ı
	The state of the s		LOVIC WI	D Y	No G.P.M. flow	THOSE		ı
	Addres MOLYTAIN HOUE, IDANO	ter.T	empers	vous TR	F. Quelity <u>8000</u>		1	_
	Owner's Permit No.				Promirepai.			- 1
_	Out of the state o	<u> </u>			□ Valve □ Cep (	- TON	—	
2	NATURE OF WORK	R W	ELL T	EST DA	TA			- 1
	R New well Despend Replacement		□ Pump KI Sailer □ Other					
				G.P.M.		Harris Pag	-	
	Abendoned (describe method of abendoning)	10 IMMERSURABLE 01						
		<b></b> -			<del> </del>			
_							=	
1	PROPOSED USE							
	2) Domestic   Irrigation   Test	8 L	ITHOL	OGIC L	og			
	D	Hedo		p 40	فياسمينا		Wes	_
	□ Municipal □ Industrial □ Stock	B.					7-	7
4	METHOD DRILLED	TO		+-3	CALICHE			
	Michigan Die Die	300		25	GREY BASALT			X
_	E Cable C Rotory Dug Other	60	2 <sup>5</sup>	39 Li	GREY BASALT BOULDER	3		X
•	WELL CONSTRUCTION	70	Li-	45	BAND & GRAVEL (CINDE	RS)		×
	Diameter of hole RER inches Total depth 1:17 feet	T.D.		46	GREY BASALT			# #
	Casing schedule: El Steel   Concrete	<b>-</b>	46		SAND & GRAVEL (CINO BLACK BASALT HARD	rka)	H	
	Timbers Disneter From To			72	BLACK BASALT RUBBLE			×
	0.20 inches 6.5/8 inches 21.15 feet feet feet inches 2.5 feet 15.8 feet	<b> </b>	72 77	77	BLACK BASALT, CREVI	CED		×
	inches feetfeet		91	97	RED BASALT, SOFT			×
	inches inches feet		97	108	GREY BASALT			X
				<b></b>	RED BASALT		$\vdash$	
	Was a pecker or seel used? ☐ Yes ☑ No				GREY BASALY REG RUBBLE BOULDES	R CINCER		
	Perforated? ☐ Yes 🔞 No How perforated? ☐ Factory ☐ Knife ☐ Torch		136	158	GREY RESALT HARD		L	×
	Size of perforation inches by inches	$\vdash$			REB-BROWN BASALT, E		-	•
	Number From To		179	180	RED CINCERS		П	
	perforations feet		180	244	RED BARALT CRABING	INTO		Н
	perforations feet feet				SACEN BABALT & INCR	EASING		
	Well screen installed? ☐ Yes El No			262	CREY BARALT, VERY			
	Manufacturer's name Model No				RED BASALT		Н	
	Type Model No DiameterStot size Set fromfeet tofeet		259	285	GREY BASALT			
	Diameter Slot size Set from feet to feet		285	297	SCET RED BARALT		$\vdash$	•
			297 292	300	CREY BARALT, HARO			
	Gravel packed?		300	305	RED SORT		-	-
		-326 126	305	112	TAM, SOFT			
	Surface east? 50 Yes		112	31.5	CREY, MICHARD		$\Box$	$\Box$
	STATE COMMISSION D. COMMISSION D. COMMISSION	300	31.5 829		BROWN BURNT CLAY			-
4	LOCATION OF WELL	-650	12.	سم	BROWN CLAY, RAND, G	BYALL MIN		~
	Statch map location must agree with written location.	10.						- 1
	<del>- • • • • • • • • • • • • • • • • • • •</del>	w	ork sta	ned	finished _			- ]
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			- <del>درسانا</del>	r Firm's A	ione .	humb		_
	Co El MOST					- Aller	_	
	County <u>FLMORE</u>	- Adress						-
NENSENM 9 1450 1 5ET			S Special Contraction Contract					-
	IST ADDITIONAL SUPERIOR OF STREET	_			NO BINE COLUMN			
	UGE ADDITIONAL SHEETS IF NECESSARY FORWARD	. me 17	nii 6, l	, LUE, A	IND PINK COPIES TO THE	ULTARTIM	NT.	



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## State of Idaho Desertment of Water Administration

### WELL DRILLER'S REPORT

State less requires that this report to filed with the State Restanction Engineer within 30 days of the completion or chandestrant of the WEL.

Annual St. State S	-		-	N DES WEST.			_
1. WELL COMES  Name WATER CONTYS-PAGE 2 OF 2-PAGES	7. 1	MTER	LEVEL				1
	١.			- C. C.	عد د		j
THE BUTTO-PART P OF 2-PAGE		latic we		feet better land ou		_	1
A-44	;		_ U ¥	F. Quality		1	-
			بر المحمدات	Pressure			-
Queur's Formit No.	ا ا	antrolli	d by	□ Valve □ Cap	D Phop		_
2 MATURE OF WORK	E #	ELL T	EST DA	ra .			
C New well C Despared C Replacement		Pump	A B 14	Bailer Down	Hages Pa		_
☐ Abarduned (describe method of shandoning)	۳						
						_	
	<u></u>			ļ	<del> </del>		
3. PROPOSED USE	lacksquare			<del></del>	<u> </u>		
	j						
☐ Demostic ☐ Irrigation ☐ Test			.00IC L	00			
	Heats		To.	Material		,	
☐ Municipal ☐ Industrial ☐ Stock	<u> </u>					Y=	-
4. METHOD DRILLED	}	361_	367	CHEY BASALT, MES	<del></del>	$\vdash$	-
	<b>—</b>	367	373	CHEVICE, SAND & BRA	ML FILLE		
□ Cable □ Rotory □ Dug □ Other		171	17.0	COLA BUOM 5			
	1	1779	179	OREVICE		•	$\vdash$
S. WELL CONSTRUCTION	<b>⊢</b>	379	391	BLACK BASALT, MED I	A86		-
Diameter of hale inches Total depthfeet	<u> </u>	391	395	BECCIA, CIMBERS, C	MANEL	•	Н
Compa estantido: D Stant D Concrete	$\overline{}$	105	401	BLACK RASALT, SUBSIL	E GRAVEL		
Thinkness Discounter Press To		101	ЫO	BLACK BASALT HARD			П
inches inches foot foot	$\Box$	Mo.	112	FRACI	URED	<b>.</b>	-
	<b>├</b>	1112	1.17	4 4 MARO		۳	
inches feet feet	<b></b>	1417	<del> </del>	CHEVICE		×	-
inches inches feet feet	<del>                                     </del>	<del> </del>	<del></del>			<del>                                     </del>	_
	$\vdash$		1				
Was a puntur or real used?							
Perference?   Perference?   Yes   No   Torch						↓_	↓_
Size of perferation inches by inches	<b>-</b>	<del></del>	<del></del>			┯	├
Munder From To	<u> </u>	┼──	<del> </del>			1-	1
thumber From To feet feet							
performance feet feet						<b> </b>	
perforations feet feet		<b>├</b> ─	<del> </del>		··		├-
Well garges installed?   Yes   No	<b>-</b>	┼	<del>├</del>			╆	┼
		+	<del></del>				
Type Model No.						$\Box$	$\Box$
Olarester Stat size Set from feet to feet Diameter Stat size Set from feet to feet		$\perp$				↓_	
	·	<del> </del>	<b>├</b> ──		-	-	<del>  -</del>
Gravel packed?   Yes   No Size of gravel		$_{\perp}$					
Pleased from feet to feet							$\Box$
Subministra City City Southern Services			<del>                                     </del>			$\vdash$	₩.
Surface east?   Yes   No To what depthfeet theretal upon in east   Convent grout   Puddling clay	`├─-	┼	<b>├</b> -	<del> </del>	<del></del>	+-	-
	<b>∤</b>	<del>                                     </del>	<del>                                     </del>	<del></del>		_	1
& LOCATION OF WELL						·	
Shouth may leastion must agree with written location.	10					-	
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	1 '	<b>1749 PD</b>	Une best	of my knowledge.			
	1					•	
	1 .		HTAIN From	HOME TELL DRILLERS	89		_
ELMORE	1 '			2, MANETT, ISANO	33627		
COMY ELMORE	·			7 // 7			_
11 421 800 9 7. 4 W. R. S. EA	ı	9/	ngi	starden_			_
A CONTRACT OF THE PROPERTY OF	1	ة عاموم	1	-,	Cate		
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State of Department of We WELL DRILLI State ion requires that this report be within 30 days after complete	ter Ad ER'S Hed w	Iminist RE	POR	4	EINE	~	) '
1. WELL CHINER	_	ATER		Selaring C a			٦
				- · ·	No Ass.	_	- (
Acres P. C. God 464, Benein, Calif				361 her below land as	400 CALL	•	- 1
000000000000000000000000000000000000000		lowing?	□ Y	n # No G.P.M. New. 2° F. Quelty <u>GRO</u>			. [
Address 15 6 . Ded 6 6 9 . Dene from Cate of		emperal	ع)_ 1000 مراسمه	preserre			٠
Quingr's Permit No.		ontrolle	d by	□ Valve □ Cap (	7 Pag		ı
Z. NATURE OF WORK	8. W	ELL TI	EST DA	TA			7
M New well Despend Replacement	2	Pump		☐ Bailer ☐ Other			- 1
	-6	-	3 P M	Oren Deum	House Fu	-	コ
☐ Abandoned (describe method of abandoning)							コ
				<del></del>	<del></del>		
	-			<del></del>			ヿ
3. PROPOSED USE		171401	OGIC L	00			٦
■ Domestic 🔾 Irrigation 🗆 Test	Hate	0=		<del></del>			-
□ M incipal □ Industrial □ Stock	Diem.	From		Material		V	-
<del></del>	6	. 0	2	SOIL			I
4. METHOD DRILLED		2	20	GREY BASALT			-
SET Cable □ Rotory □ Dug □ Other		<b>←</b>	21	BROK		$\rightarrow$	*
g can a more a set a see	-	21 31	31	CREY BASALT		_	ᆲ
& WELL CONSTRUCTION		32	23	GREY BASALT		_	ij
Diameter of hole 6 inches Total depth 410 feet		53	٠,	REO CINDERS			ュ
Caung schedule U Steel Concrete		1	27	REO PINHOLE			픠
	<u> </u>	57 65	65_ 67	DREY PINHOLE			払
Thickness Planeter From To O.250 inches 658 inches +1.5 feet 9.5 feet		57	72	GREY PINHOLE		$\neg$	ᆲ
inches feet feet		72	75	RED BURNT CLAY			I
		75	97	GREY BASALT, HARD		_	1
inches inches feet feet	<b>}</b> -	97	100 107	RED BURNT CLAY GREY BASALT, VERY	W. 00	_	井
	<b>}</b> -		108	CINDER. & RED BAS			÷
Was a packer or real used? ☐ Yes   ☐ No		1 1	723	GREY BASALT, HARD			-
Perforated?		123	1 56	CLAYEY RUBBLE			
Size of perforation inches by inches		136	138	GREY BASALT, BROKE	EN, VAY HE	1.	×
Number From To	<b>}</b> -		163	TAN BURNT BOULDER		_	늯
perforations feet feet		113	550	GREY BASALT, GRAW			┪
perforations feet feet feet				FRACTURES		-	$\overline{}$
	<b></b> -	220 2L5	245 263	GREY BASALT, INCR	EASING HD-	_	*
Well screen installed? ☐ Yes ■ No	<del>                                     </del>	261		BLACK BASALT, FRAM	CTURED		귀
Manufacturer's name		278	305	BLACK FINHOLE			X
Type Model No DiameterSlot size Set from feet to feet	L	305	307	RED BURNT CLAY			耳
Diameter Slut size Set from feet to fairt	<b>├</b> -	307	321	BLACK PINHOLE			귀
		324	338	BREY PINHOLE	<del></del>	-	늯
Gravel packed? □ Yes IS No Size of gravel		338	359	BROWN BURNT ON TO	P SR MA CLA	¥	Ī
Placed fromfeet tofeet	<u> </u>	259	373	BREY PINHOLE		10	コ
Surface seel? 2 Yes D No To what depth 19.5 feet	<del> </del>	373 373	373 393	GREY RUBBLE RUBBLE, SAND, GRA	W 1 B	X	-4
Meterial used in seel - IB Coment grout	<del> </del>		399	BLACK BASALT, VER	Y HARD		긁
			Los	• •	MOKEN		
& LOCATION OF WELL		103	44	BLACK BASALY, WE	A HTER	7	T
Sketch mep location must agree with written location	10 W	fork star	rted . A	us 18. 1972 finished		.152	2
*	,	his well	-	RTIFICATION lied under my supervision at	n." W this report i		
112NUTEEE				Mill Of the Line	Ao		
COUNTY ELMPER	-	ir iffer 's co	Fuman	2. HAMETT. JOANS B	**************************************	• · · · · · · · · · · · · · · · · · · ·	
SE, SELSK 9 45 SE EM	3	Hzy	~~	Stardin =	Tripo 20	,19	7.

	Department of We	ice Ac	الادازم				
	WELL DAILLE  S. When recommend that the contract had miss the Dries						
	des safter the even perform of					··	
١	See all Council	7. %	ATER	LEVEL		/	
	N. W. Torone S. Sterning	S	Latic wa	ter leve CD A	1_350_leer bolow is 4 surface  SO No G.P.M flow		_
	Acres Mandata Hora, Idaha	Ī	emperat	ure	F. Quality		_
	Crone is Permit No.	6	ontrolle	d by	□ Valve □ Cap □ Plug		
2	NATURE OF WORK	8. W	ELL TO	ST DA	TA		
	C New well Decouned Replacement		Pump		□ Bailer X3 Other		
	C Abendoned (describe method of abandoning)	_ °		5.P.M.	Drass Course Incor	Parks	
3	MACPOSED USE						
	T Domestic   Invigation   I) Test	9.1	.ITHOL	OGIC L	.00		
	D Municipal D Industrial D Stock	Hele Dust.	Frem		Motorial		£ '97
١,	NETHOD CRILLED	6	0 6	6	Sail Clay, leva,	干	$\mp$
•	C) Cable X2 Rotory D Dug D Other		35 12	42	Red cindate.	丰	丰
}			75	75 500	No return.	二	丰
١.	L WELL CONSTRUCTION	_			Pirst water, 350 ft.	士	士
	Diameter of hote					-	╁╌
	Thickness Diameter From To					$\bot$	丰
ĺ				-		+	+-
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	inches inches feet	_					┼-
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l	Was a pricker or east uppd?  Perforated?  I Yes I No					$\mp$	二
	How perforated? ☐ Factory ☐ Knife ☐ Torch	<del>                                     </del>					+
ĺ	Size of perforation inches by inches Number From To					=	1
	perforations feet feet	<del> </del>	-			-+-	╀
	perforations feet feet					$\perp$	
	perforations feet feet	├	-				+-
	Well screen installed?   Yes   No						1
	Manufenturer's name Model No	<b>}</b> -				+	+-
ŀ	DiameterSlot size Set from feet to feet						
l	Diameter Slot size Set from feet to feet						$\vdash$
ŀ	Gravel packed?   The II No Size of gravel						士
l	Placeri fromfeet tofeet						1
l	Surface seal? (2 Yes   D No To what depth						#
١.	LOCATION OF WELL					士	上
ľ	Sketch map location must some with written location.						
l	M	10. W	ork sta	78d	_7/7/73finished_7/12/73		
ŀ			-		100-		
1					RTIFICATION		
1	"[]]				illed under my supervision and this rep of my knowledge.	ort is	
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1	6 / ·	õ	C. L.	Hide	leston & Son N	35	_
	County tope		Mour	ntein	hora, Idaho		_
	SIZ & SIZES SE 9 T. 4 MER. 5 EM	<b>.</b>		<i>! :</i> :	Visit To	ρ.	_

PORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

ULE ADDITIONAL SHEETS IF NECESSARY

### WELL DRILLER'S REPORT

Shale has requires that this report be filed with the Director, Department of Water Administration within 30

1. WELL CHINER	7. 🗷	ATER	LEVEL			···		
				<b>.</b>		•		
num Many took Key				361 for below land as				
som South Paine, Dole				M 45 No G.P.M. Now				
noon south face, - Roll	1 7		Man (T)	Y_* F. Quality				
(	1 ^	rtoner	closed #	P. 1.	<b></b>			
Conta's Permit No on the second of the secon	C	c ittulie	4 pA	□ Valve □ Cap	D Plue			
· ·		& WELL TEST DATA						
2 NATURE OF WORK	8. W	ELL TI	EST DA	TA .				
	٠,			5 8-1 5 00mm				
ul New well (1) Despend (2) Replacement		rump		☐ Barler ☐ Other ☐ Draw Down	Harry A.			
C Abendoned (Jesus star method of abendoning)	L_°	-	G.P.M.	Orto Ocus	100017			
C Additionate (Section in that of availability)	┡—				<b>├</b>			
				<del></del>	<del> </del>			
	<b></b> -			<del>+</del>	<del> </del>			
1. PROPOSED USE	<b>-</b>			<del></del>	ــــــــــــــــــــــــــــــــــــــ			
	l							
C Demostic C Impetion C Test		JOHTL	OGIC L	.00				
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() Municipal () Industrial () Stock	-	-	70			Ve M		
				Tet doel + Be	· le	I IX		
4. METHOD DRILLED		3	15	Caliche		1		
		15	18	Beater Black	ter.			
El Cable   Resery   Dug   Other		1,9	140	Alan, dame to	-	٦.		
		J.C	45	Sent Comment	7.J			
S. WELL CONSTRUCTION				water least of t	4	☐ ¥		
		145	40	Ricate Pellin	Here			
Diameter of hote 8 Inches Total depth 432 feet		45	65	Red Crakers		1		
Casing sphedule: IP-Sheel II Concrete		65	150	Mari an Arce	Herry	TT X		
Yhahesa Blasser From To		157	175	Hall Gray 10	·	גוו		
.C25 inches & inches + 1 feet 2 C feet				الدامة حسات ا		1 4		
inches feet feet	<u> </u>	125	180	Al leader		<del>                                     </del>		
inches inches feet feet	L	180	200	March Bankata	Zi-	1 1 1		
inches feetfeet	L	205	220	Bui ander		X		
instas feet feet	<u> </u>	200	265	Kad Deales	Fee.	<b>                                     </b>		
Was a pander _d used? □ Yas □/No	L	265	285	Red Olakan B	e le	<u> </u>		
Performed?   Yes Grille	<b></b>	225	305	bland Strang	Carry	<del>       </del>		
How parteresse?   Factory   Knife   Torch		300	310	Bycka Cyck	Bel lean	كبالم		
Size of perforation inches by inches		13/6	244	yellogi- Clay		7 7		
Mandar From To	<u> </u>	1540	352	yellon - f they		<del>                                     </del>		
perferetions feet feet	├				and .	<del>₩</del> ₩		
perforations feet feet	<u> </u>	750	300	Bear Profes	<u></u>	<del>                                      </del>		
perferetions fact feet	<b>├</b> ──	20 -	405	4. 1 6	1	<del>lv M</del>		
i	┝─	1700	414	Stand Street		<del>r lu</del>		
Well cores installed? 🗆 Yes 🐵 No		1111	1/2 1	10 3/	0 47/	<del>l. 1</del>		
Manufacturer's name		***	734			<del>                                     </del>		
Type Model No								
Diameter Stot size Set from fort to fact								
Diameter Slot size Set from feet to feet								
1								
Gravel pashed?   Yes   IPNo Size of gravel								
Placed fromfeet tofeet	<u> </u>							
Surface and Effect D No. To what depth 2 C feet	<u> </u>							
Minuted word in cost . C. Company const C. Budding clay		-				$\vdash$		
Minuted used in seel   Comment grout   Puddling clay	├	<b>—</b>	<b>-</b>	<del></del>		$\vdash$		
& LOCATION OF WELL			Щ.	<u> </u>				
a common or week								
Shotah map location must agree with written location.	10.		_	- 6	<b>-</b> ,			
/	w	fork sta	m £	- 11, 1574 Animas	Maria	ركلية		
l ≰ [:]	_							
8	11 1	SIL I	87.00	RTIFICATION	7972	r .		
3	,,	Tale and				_		
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}····!···•	· '			-				
<del></del>	٠.	السينا	11	11/1/1/ 00	11			
•	4	<u>4./.4</u>	424	Lich Harle	. #	<u> </u>		
$\leq r$	1.	灰"	4	<del></del>	21			
Course to diff	L,		04	1/m . 54 mer	<del>57,</del>	مك		
Cango 7 177, 5 w 14, 5 E 17, 5 HV, WE HA Sin & SE 4 800 9, 7. 4 BM. M. F. 610 The w. Parker Surdinger (Plat)	•	77.1	V '	()     1	7 < 0	711		
They be see g. T. & BM. R. S. END		44	me	11 acoult	T-41	-14		
Thomas Carper Sulferger (Platis)				<u> </u>	080			

DEPARTMENT OF WATER RESOURCE
WELL DRILLER'S REPORT
For that this report to final with the Director, Department of the life has been after the completion or chandenment of the se

								_
1. WELL OWNER	7.	WATE	IN LEV	YEL				
None CHARLES LA FOY	İ	-			ا بروا العالم العالم العالم العالم العالم العالم العالم العالم العالم العالم العالم العالم العالم العالم العالم	rel aurime.		
		Flowin	, (	] Y.	ENO GPM. Re	<del></del>		
Min House	l	Artesi	en clos	<del>40-40</del> ;	E-No G.P.M. Re Pressure	i.		_
•		Септи	olled b	y: [	Valve C Cap (	⊃ <b>P</b> ⊷•		
Corner's Permit No.		Temp	rature		of Quality			_
2. NATURE OF WORK	8.	WELL			-			
Their well Despend - Replacement	1		mp	0.	eller D'Air C			
Abundance (describe method of standaning)	Η,	<b>Y</b>	GPM		Purreing Lovel	Hanna A	_	
				1		<u> </u>		
				$\Box$				
1 PROPOSED USE			· ·	}-		<del> </del>		
								_
■ Domentic    □ Irrigusion    □ Test    □ Municipal	●.	LITH	DLOG	IC FO	3			
Industrial   Stack   Waste Disposel or Injection   Other	Hete	De	nh.	]			The state of	
C COLD (DEDITY NYME)		From	ް.				Yes	_
4. METHOD DRILLED	100	2	3	-	TOP SELLE ELL GASSLE ELL BASSLE ELL BAS	4467	$\vdash$	-
	<del>  *</del>	13	++-	1.6	PELL BASALT FO	- CONCO	$\vdash$	7
Syfteeny (SyfAir   Hydraulic   Reverse rotary   Cable   Dug   Other	8	16	2.2	6	EN BASALT H	ARO	<b>†</b> 1	
	6	22	24	R	O BASALT	MED		1
& WELL CONSTRUCTION	_							ū
	6	29	34	ns.	K BASALT C	ساو_تبه	1	<u> </u>
Cosing schedule: 🎾 Steel 🗆 Concrete 🗆 Other	4						1	Н
Trigates Character From To  26 Inshes 6 Inshes + 1 feet 12 feet Inshes Inshes feet	6	101	11	0	IN BASALT	460		
instea instea feet feet	4	112	ᆣ	عيد	My BASALT 1	daeo	$\sqcup$	
Inches Inches feet feet feet	<u>-</u>	124	-137	RE O.	CARE P	wev	╁╌┤	Н
feet feet feet	6	13	5 2 9	+	TAL LOSS C	Ευ <u>υ</u>	╁╌┤	$\dashv$
Was cooling drive shee used? ☐ Yes ☐ Yes ☐ No				113	Tipy			
Was a paster or seel used? □ Yes □ 'No Performed? □ Yes □ Yes	<u> </u>							
How parterated?   Factory   Knife   Terch				<b></b>	525 BACK	همجحمه	-	
Step of partenation Inches by Inshes	Η		_	H-AN	Mich Contract	77 <del>2.5</del> 5	╂╌╌┤	
Itumber   From   To		i			12 C C C C C C C C C C C C C C C C C C C	7 - 11	1 -	
perferetionsfootfoot								
errienten fest fest			L	-	- FEB 24	90	Щ	
perforationsfeetfeetfeet Well corean installed? □ Yes ☑*No		-			100		<b>├</b>	
Manufacturer's name	_			-	Department of Plater	Resources	1	┝
Manufacturer's name Type Diameter Stot size Set from foot to foot					Western Regiona	1 Off ,ce		
Diameter Slot size Set from fort to fact							Γ	П
Gravel pathet? 🗆 Yes 🖼 No 🗅 Stan of gravel		$\vdash$		-	(a)		₩	Н
Pleased from fact to feet	┝─	$\vdash$			110		╃┈	$\vdash$
Surface and depth 18 Meterial used in seel: D Coment grout:						<b>-</b>	$\Box$	
©'Tuddling clay □ Well cuttings Septing procedure used: □ Sturry pit □ Temp, surface casing	ļ	<u> </u>			FEB I	9 362		
(If Overbore to seel depth		$\vdash$		$\vdash$	Repairment of	W E	┢	<del>                                     </del>
Mathed of joining easing: 🖸 Threaded 😅 Welded 🗆 Selvent					The state of the s	or Hear Manage	+	$\vdash$
Weld							二	
Describe access port	10.							
		We	rk steri	₩ 4	1/15/61 Rovers	9/12/	31	_
	_	-						Ξ
e. LOCATION OF WELL	11.				IPICATION 🕰			
Sketch map loostlon must agree with written loostlon.					of minimum well cons		ris o	*
Shaddydon Name	l	campi	165 wit	n at 1	no time the rig was raine	·	_	
		Firm I	lama	14.4	AELOTON I			
								-
		Addre	<b>-</b> 21	$\Box$	Sex present	Des _4 - /	9-	Ð
Let No Bleat No						_		_
	l	-	<b>       </b>	rm O		<u> </u>		-
comy felmack	1			-				
			•	(Opera	m)			
ME & SE & See. 9 , T. 4 MAR. R. S. EAR.					1/			
USE ADDITIONAL SHEETS IF NECESSARY - F	OAW/	AD TH	1E WH	ITEO	DPY TO THE DEPART	MENT	_	_

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Form 238 7 9 82

## STATE OF IDAHO DEPARTMENT OF WATER RESOURCES

## PARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Webs Resources
within 30 days after the completion or abandonment of the well.

							_
1. WELL OWNER	7. V	NATE	R LEV	/EL	100		
Name CASKLES R. FLANGIA	9	Static	water I	level 3.44 feet below land	surface.		
Address 4.10 A JARSH PL MILIONE ID		Flowii Artesi	ng? L an clos	Yes No G.P.M. flow ed-in pressurep.s.i.			-
Owner's Permit No. 11A	1	Cuntre Tempi	er sture	y:   Valve   Cap   1     OF Quality			_
			Desc	cribe erletien ar temperature zonet L	010-00		-
2. NATURE OF WORK				DATA			
				ÆBailer 🗆 Air 🗆 C		_	_
materials, plug depths, etc. in lithologic log)	<u> </u>	herg	G.P.M	Pumping Level	Hours Firm	<u> </u>	
	[						
3. PROPOSED USE						_	
	9. 1	LITH	DLOGI	IC LOG			
□ Other (specify type)	Bore Diam. F			Material	}	Yes	
				1.5 'C.L.			-
4 METHOD DRILLED	<del> "  </del>	7	7	HASS FAN			$\vdash$
1	$\vdash$	3	16	4.3 CS 14.W		$\neg$	$\neg$
☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary		1.	27	BROWN LAVA			
X Cable Dug D Other		יי.	3.2	GLAY LALA			
5 mg		10	47	SEAN LANA (BE.	MEN)	_]	$\Box$
5. WELL CONSTRUCTION			لك				-
Casing schedule: X Steel			74		<u> </u>	$\neg$	-
Thickness Oymeter From To			787				-
Thickness Dymeser from To	<b>-</b> -	04	147	GREY ENVA			
inches inches feet feet		رسه	18	BRAUN LAVA 150	36K 41)	$\neg$	П
inches inches feet feet	1	15	147	CRAY LAVA			
inches inches feet feet	L = L	199	125	BRUIN LAVA GIETAL	set its		
Was casing drive shoe used? ☐ Yes ₽No	] ]2	20	273	1.54 10 - 1.16			
Was a packer or seal used? ☐ Yes D No. Perforated? ☐ Yes D No.		23	23c.	CETY LAVA			
How perforated?  Factory  Knife  Torch	<u> </u> 2	உ⊥	240	CGY LAVA			$\Box$
Size of perforation Inches by Inches		12	247	Blewid Stay			Н
Number From To	<del>   </del> }	<del>//-</del> -	277	CINIERS		J	Н
perforations feet feet	1 1	71	: N	HASD CRAY LAWY		<del>-</del>	$\vdash$
perforations feet feet	l E	26	335	ahre LANA		$\neg$	
perforations   feet   feet   feet   Meti-screen installed?   Yes   Se No   Manufacturer's name   Meti-screen installed   Meti-		15	125	Chay LAN'A			
West screen installed? U Yes 18740	l ₽.	251	[ذك∱	actual LAVA			_
Manufacturer's name Model No	┞—#	35	111	DE DUITING	<u></u>	4	Щ
Diameter Slot size Set from feet to feet	┟╌╌┤╌	_					-
Diameter Slot size Sal from feet to feet	$\vdash$			10)	<del></del>	-	$\dashv$
Gravel packed?    Yes				Mi to to the first			
Plant from feet to feet				1 !!			
Surface seal depth   91   Material used in seel:   12   Coment grout   12   Bentonne   12   Puddiing clay   13   14   15   15   15   15   15   15   15	$\Box$		]	JUL 26 1000			
Sealing procedure used: Slurry pit C Temp. surface casing	<del>                                     </del>		<b>—</b> -∤	1, 1903		i	-
Overbore to seal depth	<b>├</b> ──┼		$\dashv$	Usualinam or			
Method of joining casing: ☐ Threaded ☐ Welded ☐ Solvent	[-+					$\dashv$	$\dashv$
Weld							
Describe access port NA	10.			·	•		
Describe access por _74//	1	Wor	rk start	ted 23Mby 53 Rinished	2 Tw 8	3	_
	<del>                                     </del>			<del></del>		_	$\overline{}$
8. LOCATION OF WELL	11. (	DRIL	LERS	CERTIFICATION	æ		
Sketch map location must agree with written location.	۱ ۱	I/We :	certify	that all minimum well construc	rtion standard	h we	, l
N				h at the time the rig was remove			
Subdivision Name	l -			Carl La Dill	st s	3	
	l <sup>r</sup>	tim y	iame <u>(</u>	(E) COLLED DELL ! Fin	m No	7_	_
w	۱ ،		. 13:	1 14 7 A	·=		
Lot No Block No.	1 ~			7 77 7 - V . W. W. D.			-
D. 10 _ BOX 10.	s	igned	by (f	irm Official)			
	]	-		and 3			•
County ELMORE	1		,	Operator)			
NW NE & Sec 10 T + NOR 5 PM	İ		•	character of the	A -	-	
IN WINCH SEE IN T T NOTH TO COM.	<u> </u>						

Form 230 7

the property separate weapons

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## STATE OF IDAHO DEPARTMENT OF WATER RESOURCES

ULE TYPEWRITER OR
BALLPOINT PEN

## WELL DRILLER'S REPORT

State law requires that this report be filled with the Director, Department of Water Resources within 30 days after the exemplation or abandonment of the well.

within 30 days eithe the compte	- mag	r aband		I OL BIG BOY	سب	
L WELL OWNER	7.	WATE	R LEV	/EL SOURCE PRO P.		
Nome Dan Locker		Static	water I	level 396 feet below land surface.		
Assess Mtn. Home, ID 83647		Arrai		Yes I/I No G.P.M. flow ed-in pressure p.s.f.		-
Owner's Permit No.		Contr	olled by	Y:   Valve   Cap   Plue		
Owner s rainit (10.	<u> </u>					
2. NATURE OF WORK	•			DATA No Test		
New well Despend Replacement  Abendoned (describe method of abandoning)	L		mp 			
		Discharg	G.P.M.	. Pumping Level Hours Pu	~~~	_
	_					
1. PROPOSED USE	匚					_
Domestic   irrigetion   Test   Municipal   Industrial   Stock   Waste Disposal or Injection				C LOG	Г.	=
Other (specify type)	Diam.		To	Meterial	Yet No	
4 METHOD DRILLED	90	188	1812		├-	-
St Rotary   Air   Hydraulic   Reverse rotary			530		$\vdash$	
Cable Dug Other		م	9/L 45	Quebucken	匚	Z
S. WELL CONSTRUCTION		992	47	CHANCE EAS	士	V
Cating schedule: SZ Steel     Concrete   Other		47	104 108	BIACK LAVA		1
Thickness Digmesse From 1/2 feet 18 1/2 feet		108	430	LAUR	V	
Inches feet feet			444 534		2	
inches Inches feetfeet	<del> </del>	_	-			
Was casing drive shoe used? ☐ Yes ☐ No Was a packer or seel used? ☐ Yes ☑ No						
Perforeted?						
How perforeted?				WE CHENTER IN		
Number From To			-	الله المالية المالية المالية المالية المالية المالية المالية المالية المالية المالية المالية المالية المالية ا		Н
perforationsfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeet				SEP 25 1979		
Well screen installed?   Yes G No						
Manufacturer's name Type Model No Diameter Slot size Set from feet to feet Diameter Stot size Set from feet to feet	<u> </u>			Department of Hater Percentage  Winters - Egiscol Direct		
Diameter Slot size Set from feet to feet				را کا تا بازن پر ان ان ان		П
Gravel pouted?				UCI 4-1379		
Surface seel depth 181/2. Meterial wood in seel: If Coment growt				<del> </del>		
Sealing procedure used:     Puddling clay   D Welf cuttings						oxdot
## Overbore to seel depth  Method of joining casing: ** Threaded ** Welded ** Solvent			$\vdash \dashv$		<u> </u>	H
Weld  Comented between strate	ZS					
Describe access port	10.	Wo	rk steri	nd 8-27-79 finland 8-29	- 7	2
& LOCATION OF WELL	1,2	DRIL	LERE	CERTIFICATION		
Sketch map location must agree with written lecetion.	"	l/We	certify	that all minimum well construction standa	rds w	810
Subdivision Name		-		h at the time the rig was removed.		
		Firm (	Name E	selou Drillingu Brook im No. 29	<u></u>	_
W		Addre		1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	12	_
Let No Blook No		Signer	by (Fi	irm Official) Bul William	Ŀ	7
come to Consend		•		m Billy		7
C.) C.)			•	Operator)	<u>L</u>	5
SW & SW & BOR 10 , T. 45 MB, R. 5E EW.			_			/

USE ADDITIONAL SHEETS IF NECESSARY - PORMAND THE WHITE COPY TO THE DEFARTMENT

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ME TYPENRITER ON BALL POINT PEN

TOTAL CONTROL CONTROL CONTROL

Mente comments
Department of Water Resources

### WELL DRILLER'S REPORT

State less records that this report by filed with the Director, Department of Water Resources within 19

WELL CONNER     WATER LEVE!	The same
Address MT H Charles	<u> </u>
Owner's Permit No Controlled in present U.S.  2. NATURE OF WORK  Buffers and 11 Despaced   Replacement   Pump Rather Gentler  3. Absendenced internition interned of absendences    3. PROPOSED USE  13. PROPOSED USE  15. Promotion   Stock	<sup>γγ. β. γγ. β</sup>
Control Permit No  2. MATURE OF WORK  Soften seet 11 Despared   Replacement   Pump   Raiter   Seet	<u> </u>
2 NATURE OF WORK  General court 1 Despaced   Replacement   Pump   Railer   Sent court    3 Approached inserted method of desirationary    3 PROPORTS USE    Despate   Despate   Despate   Despate   Despate    4 METHOD DRILLED    Cable   Lefterory   Doug   Done    5 WELL CONSTRUCTION   Concrete   Total deprin      Lefterory   Sent   Despate   Concrete	7
Beauty CFM   Describe mented of shardowing)	<u> </u>
Appendictual interests increase   Description   Descript	3 = 1
Description   Description	
Committee   Designation   De	
State   Stat	<del></del>
a METHOD DRILLED  A METHOD DRILLED  Gate E-Platory Cl Dug C Other  E-WELL CONSTRUCTION  Discrete of hole C mores Total depth S2C test C 72 75 5 767 7 12 12 12 12 12 12 12 12 12 12 12 12 12	
Cable 6-Hotory CDup COtton  E WELL CONSTRUCTION  Discussion of hole 6 months Total depth SAC from 17, 22, 35 GAM LAND  Livering schedule Steel Concrete  Thomas from 1 months	
Cable 6-Harry C Due C Other  6 35 47 6 884 LAnd  6 WELL CONSTRUCTION  Discourse of hole 6 person Total depth 52C from \$72.75 (String Land) Discourse  Thomas Transporter 1 total depth 52C from \$72.75 (String Land) Discourse  Thomas Transporter 1 total depth 19 foot person 19 f	-
Discrete of hole & series Total depth \$20 ten \$ 72.75 fristy sales Dealer Dealer There There There I are 19 ten 19	
Dismeter of hole and Total depth \$20 hore \$ 150.02 Mortan #Childy Cine hours school of The Total And Market hours from the 19 hore 19 hore 19 hore 19 hore 19 hore notice hours hore hore hore hore hore hore hore hore	
450 mother 1 7 mother 1 19" feet mother mother test test	
15 notes 17 notes 1 her /7 her	L
unchin, unchin, feet feet	
inches inches feet feet	
Who coming drive shoe used? □ Yes B*No 15th a product or yes used? □ Yes B*No	
Pertorateg?   D Yes Girlio   How partorated?   D Factory   D Knife   D Torch	·
Sure of Everioration archive. by mones	
perforacions feet feet	
parlaments for loss	
World screen entitled? (1) Yes 3766	
Naturatura's rate	
Dunieter Stat are Set from feet to less to less	
utand Pacadir (1 Yes □ No Sup of grand	
Placed fromfeet to	
Service and L. Service and a service O Consult grown	
Suding Processes and C Story or C Supply unique story	
O'Traction is and dated	
& LOCATION OF WELL Wash started 7:11-22 houses 7-15	-21
Basis may leaden must agree with correct teapons.	
Willato Della	35
- Wat Hone	
the state of the s	2-15- <i>77</i>
I com Elaise	2-15-17 2 -
1 4/4 611 10 11 . 6	2-15-17
LIN ANDITIONAL BREETS IF RECEISARY FORWARD THE WHITE COPY TO THE DEPARTMENT	2-B-17

UST TYPE WRITER OR BALL POINT PER

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1

State of Idaho
Department of Water Resources

## FF TE FO

WELL DRILLER'S REPORT uit this report be filed with the Oliferror, Department of days after the completion or abandoninus of the view 1 WELL OWNER 7 MATER LEVEL m Steve Bens Static mater level 370 fort below land earland Floating Silver Silver G.P.M. How \_\_\_\_\_\_ F. Quality \_\_\_\_\_\_ ADDIN Mt Home ... Ourse's symut No 6/ 2078 Controlled by 2 Valve C Cap (3 Plus R WELL TEST DATA C. Bailer C Other X Pump [] Abendoned (describe method of abendoning) 1 PROPOSED WAS @ Democrite | | | | | | | | | | | | ☐ Test ☐ Other Seasofy 1996 9. LITHOLOGIC LOG V 4. METHOD DRILLED CLifletory C Due C Other E. WELL CONSTRUCTION Total depth 475 her Diameter of help . D-5140 250 mm 65 18\_ feet 0 I No No No O Yes D Ya O Feet C Tarch ☐ Knife 417 416 Q Yes E No Stat size \_\_\_ Set from ched? 🛘 Yas 💐 No Siss of gr II Product day O ----**#** ••• & LOCATION OF WELL NE NE V CO **.** T.,

PORWARD THE WHYTE GOPY TO THE DEPARTMENT

USE ADDITIONAL BHEETS IF NECESSARY

: P

USE TYPENRITER OR BALL POINT PEN

CONTRACTOR OF STANDARD ASSESSMENT STANDARD INCOME.

## State of Idaho Department of Water Resources

### WELL DRILLER'S REPORT

WELL DRILLE	:14.9	RE	PU	Da series	/		
S .te law requires that the report be filled with the	Directo	or, Dep	-	of Weter Resources with a 20th of hele	· ·		
1. WELL OWNER	7 *	ATER	FEAST				
Nome JACK STREETER	, s	atic wa	ter leve	378 feet below to sti surface	_ · · ·		
•	F	lowing/	ע נו	of ENO GPA flow Baker	le sul		
Arm Mountain Home, Iduko	Temperature 6 6 F. Quality, 2004						
		Artesian closed-in pressurep & i.					
Owner's Permit No		SOLIOIN	O DA	□ Valve □ Cap □ Plue			
2 NATURE OF WORK	8. W	ELL TI	EST DA	TA			
_							
13 New well Depend D Replacement	_	Pump		☐ Bailer			
Abendoned (Jescribe method of abandoning)	°	-chwin	G.P.M.	Draw Dawn Hours	u nied		
() MORADO (GEZ YOU (MICHOL D) BORNOOMING				+			
3. PROPOSED UNE							
□ Domestic □ Impelien □ Test □ Other Specify type)	9. L	ITHOL	OGIC L	.og			
☐ Murruppi ☐ Industrial ☐ Stock ☐ Worte Disposal or	Hote	D-	prih.	Motortal	P Mar		
Injection	Duam.				Y= 3.6		
4. METHOD DRILLED	_6°		2	Topsoil	+		
		2 21	12	Gray Lava			
(F Cable   Rotory   Dug   Other		13	25	Brown Lava			
0		25	36_	Crevicy open ground			
& WELL CONSTRUCTION		36		Brown burnt boulder clay			
		1.0		Cinder and Bubble			
Diameter of hole 6 inches Total depth 510 feet		_53	77	Eari black Basalt	4		
Casing schedule: Steel Concrete		_77	108	Open Ground	<del>- </del>		
Promo Planeter Promo To feet 19 feet		102	115	Gray Lava	<del></del>		
inches feet feet	<u> </u>	118		Black Biralt	<del></del>		
inches feet feet	<b></b>	151	160	Black Ecoliers	<del></del>		
inches feet feet	<del></del>	۔ عذ		Gray Pabalt Crewing	+		
	<del></del>	151 169		Srown Basalt Open Ground	<del></del>		
inches feet feet feet Was casing drive shoe used?		172	180		<del>-}</del> ;		
Was a packer or seel used? ☐ Yes EE No	<b>-</b>	181		Cinders	-; <del></del>		
Perforated? 🔲 Yes 😢 No		182		Red Basalt	<del></del>		
How perfurated?   Factory   C Knife   Torch		195		Cinders			
Size of perforation incises by inches		197		Brown Basalt			
Number From To		210		Very hard brown Sugalt			
perforations feet feet		215		Hed Lave			
perforstions feet feet		260		Brown Leve			
perforations feet feet	<b> </b>	295		Gray Lava	4		
Well screen installed?		340		Sema Leve	+-+-		
Manufacturer's name	┝─┤	378		Prom Cindors	<del>                                      </del>		
Type Model No	<b> </b>	410		Gray Lava	+		
Diameter Slot size Set from feet to feet	<del> </del>	468		Brown Lava Red Ciniers	1 = 1		
Diameter Slot size Set from feet to feet	$\vdash$	490	-210	Red Cliniers	<del>  ^ </del>		
					+		
Gravel packed? 🗆 Yes 🌹 No Size of grand							
Placed from feet to feet							
Surface and depth 18" Material used in seal Of Compat group		E					
					1		
Problèm day Well cortings					<u> </u>		
Cooling procedure want 🖽 Marry plf 🚨 Temporary surfects equing				L			
Overhave to seed depth	l			(4)	-		
A LOCATION OF MALE	14.		1	b 10, 1975 mc 5/6 27	ا م می رو		
a location of well	₩	ork sta	<b>~ /</b> 3	THE INTERNATIONAL PROPERTY.	. L. L. L. L. L. L. L. L. L. L. L. L. L.		
Sketch map location must agree with written location,							

County SM & M/x Sm 10 T 4 NF) n 5 Pm

LIFE ADDITIONAL SHEETS IF RECESSARY FORWARD THE WHO 2 COPY TO THE DEPARTMENT

## WELL DRILLER'S REPORT

Materials repaired that this report be fired with the Director Department of Water Administration within 30

days of son the currenters	n or 4	انحطا	120000	U 1100 A		
1 WELL ORNER				LEVEL		
Nome JOS MERMANDLE, FAN. BRADOURY, JACK ST	-, <del>ф</del>		itatic d	-	386.5 feet below land surface	
	ł	•	, pCate i Li	g' Y atuse	n I No GPM floor F Quality 8008	
AMEN STAR ROUTE B. W MITAIN MINE SOLL	1				n pressure ##1	•
Owner's Permit No.	- [	. (	.ontroi	had by	Valve C Cap D Plus	
2 MATURE (H WOHL	1	. v	WELL.	TEST DA	ITA	
The same of the sa	Ì		Pum	ts.	13 Barier □ Other	
	H			GPM	Bran Down Hown	7
mateur control of the	Ì		•			
					•	
3 PROPOSED USE	7				<u> </u>	
	ļ					
B Dumienta Irrapatio - Eest	ļ			LOGIC I	LOG	
Municipal Industrial C Stock		Hair Duam		- F	Monaral	Va. 4-
4 455400 004 150	┪	6:	,506	,512_	GREY BASALT, YERY HARD	X.
4 METHOD DRILLED	H		·异1 2	5111	CREVICE, SAND FILLED	
F Cable 13 Refery 1 Dug □ Other	l	- 			:	
5 WELL CONSTRUCTION	7		514	520	BROWN BILYSTONE-SANSSTONE- CONGLOWFRATE, ZJANTZ & ALL	
	Ł		<u> </u>	<del></del>	OTHER COLORES VIRERALS, RE	
Degrees of hote & inches Total depth 570 M Casing schedule © Steel © Concrete	•••		]	*22.	PLACE, GREY, ET.	Ξ.
The Description To	- }		550	ز.0رد د او کو کم	ARONN - THEY BASALT	\ <del>* *  </del>
	eet æi		353	556	THEY BARALT	T ×
	eer		556	510	BY W. VARIEGATED BASALT	
			•	1	<u> </u>	1
enches notes feet	1			<del>                                     </del>	<del></del>	-
Was a pectuar or steel used? U Yes U No	ŀ			<del> </del>		
Perforated?	F		-			
Suze of parforation inches by inches	t		<b>.</b>	1		
Shumber From To			<del>-</del>	T		
perforations feet !	<b>-</b> :[		•		<u> </u>	+ +
perforations feet	<b></b>		1	<del></del>		+
Well screen installed? ☐ Yes ☐ No	ŀ			+	1	+
Menufacturer's name Type Model No.	· · · [		-	-		
Dumeter Slot size Set from, feet to	•••		-	+		<del></del>
Dismotar Slot size Set from feet to	901		1	+		•
Gravel packed? (3 Yes: (3 No Size of gravel)	ł		<u> </u>	<del>-</del>		· - ·
Placed from feet to	ret		• —	-• .	•	
	••• <del> </del>		1	<del>-</del>		<del></del>
Miltered used in seel   Coment grout   Fuddling clay			1	•		<del></del>
& LOCATION OF WELL	7		<u> </u>	ــــــــــــــــــــــــــــــــــــــ		
Skatch map location must again with written location		10				
( )	1		tork st	arted #	is still lour thumbed fruit 14	. 1974
	٦					
01 0/K	- 1				RTIFICATION	
					illed under my tupervision and this repol of my knowledge	7 16
المثلثا ا	- 1				•	`•
•	J	,	C unit	AIN HO	ME MELL OFILLERS	<u> </u>
County[LYCAF COUNTY	1			. 112.		
NE	1	4		- • ·	F 77	, 1
inde u Burusau 1′ 1 las inis a SE e	*	`4	12:1	HUK	ATT LOLE C 6-2	14
		_		7-00		

SE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE BLUE AND PINK COPIES TO THE DEPARTMENT

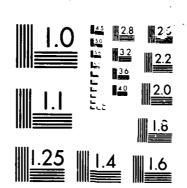
## KEWENAEM

## State of Idaho

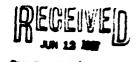
State law requires that this report shall Engineer within 30 days after completion or a	bendense	est of the well.	
WELL OWIER:	Sime of	drilled hole: 200 of well: 706 Standi elow ground: 705' Test delivery: efe Pump? Bail	Total
Base Oscard, Streeter	dopth .	f well: 706 Standi	ag water
Address 955 %. 10th %.	level b	eles Ground: 3781 3	<del>201</del> .
Mta. Mone, Jusho 83647	Lans.	Test delivery:	
Owner's Permit No. 4-M/N	81 80 07	pump and motor wood to	eeka taat:
MATURE OF WORK (check): Replacement well	1	· -	
New well Desponed Abandoned	Longth	of time of test:	re, Kin,
<del></del>	Drawdou	m:ft. Artesian pro	soure: ft.
	above 1	and surface Give fle	<b>~</b> •:•
NETHOD OF CONSTRUCTION: Retary Cable E	C	gpm. Bautoff pressure:	M-2 1 T
(explain)	No cont	Ind by: Valve   Cap	round sasing?
CASING SCHEDULE: Threaded Velded X	Yes	No 🗇	
20 "Diam. from 0 ft. to 18 ft.	DEPT	H MATERIAL	VATER
Dias. from ft. to ft. Dias. from ft. to ft. Dias. from ft. to ft. Dias. from ft. to ft. Thickness of casing: 3/15 Natorial:	FRON T	TH MATERIAL TO LET	TES OR NO
"Diam. from ft. toft.	IFEET FE	D.T	<del></del>
"Diam, from ft. to ft.	H-24-	8 Topsoil 7 Luose : Fulders	<del></del>
THIS TAKE OF CORTES. 7/10 METALIST.	19 3	8 Jray lava	
Steel a concrete wood other	38 9	3ed lava	- <del>1</del>
	93 14	2 Jruy lava	1
(explain)	142 16	lioulders	
PERFORATED? Yes 🔲 No 🔃 Type of	161 20	4 Jrown Lava	
perferetor used:		3 Cinters	
	243   27	B Gray Luva	<del>}</del>
Size of perforations (ros (t) to (t)	317 36	7 Cinders and boulders 8 Brown Lava	<del></del>
perforations from ft. to ft.	358 28	B Jr.y l va	·
perforations from ft. to ft.	388 43	l liniers Yes = bril	Lint Lier
perforations fromft. tof;	43. 151	5 linose rowd	
Size of perforations:    perforations from	415 57	I Jarama Lava	
	571 61	3   Sinders	
Type   Nodel No.  Diam. Slot size   Set from   ft. to   ft.  Diam.   Slot size   Set from   ft. to   ft.	6.2 65	L action make	
Diam. Slot size Set from ft. to ft	107 100	6 Grane and	inter .
	1 <del>563 //×</del>	0 840911	
COMSTRUCTION: Well gravel packed? Tes			
So. alse of gravel Gravel placed from ft. to ft. Surface seal			
provided? Yes No L To what depth?			
ft. Material used in seal:		<del></del>	
	<del></del>	<del></del>	<del></del>
Did any strata contain unusable water? Yes	<del></del>		<del>~  </del> -
No. Type of water: Depth of strate ft. Hethod of scaling		<del></del>	
Depth of strateft. Method of shaling	<u> </u>		
etrata off:			
Surface caning used? Yes 1 No.	<b> </b>	<del></del>	
Command in place? Yes No X	<del> </del> -	Test title of the s,	<del></del>
Locate well in section 10	<del></del>		<del></del>
		190720 (52: 1,907 0.10	<del></del>
	Work at	arted:/ /57	
	Work fi	inished: 5,17/37	
50c - 10		'iller's Statement: Amis I under my supervision as	
		o to the pest of SA weeks	
	1	A. B. Oulley	6
*** - *** *	_		an Idaha
	1	1268 by Jah H. Hen. He	men' forus
	Signed	bro I Fitoria	
• • • • • • • • • • • • • • • • • • •	License		/1/57
LOCATION OF WELL: County Elapre Idaho	1		
MY N MY N Sec. 10 7. 4 8/8 R. 1 2/9 B.H.	ı	USG	S

Oscar J. Streeter Desert Entry No. I-015553; Marjorie M. Streeter Des. Entry No. I-015579

AD-A169 416 INSTALLATION RESTORATION PROGRAM PHASE II CONFIRMATION/QUANTIFICATION STAGE I(U) DAMES AND MOORE PARK RIDGE IL 24 FEB 86 F33615-83-D-4002 2/3 UNCLASSIFIED F/G 13/2



LA	YNE	PUM	PS,	Inc.
	Name of			8



			TWEE PALLS.			
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7>		, to by mak	-	- Atta	Lyin	ti 25/2
- S	ack Sta	te	LOCATIO	mt.	Home	Alamat 29-1
	<del></del>	_ <b>W</b>	• . 515 ·		Country in T	M
-	· Lone 388.	·	-			. Orlino Str
Chippe	My Mas	Die	halle Pipe to the .		<b>to</b> d	Od & Lage 570' 10
	Voter Lond PL from Top	RPM	Order Ambre	GPM	) The same of the	Remarks — Bank? Countries Wass? do.
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1:00				800		Land
6:00				1100		Soular
1:30	!	1		1400		bula
7:00	425			1750		L. In
12:00	435'			1750		Sand
	despect to an arrange to	)# 15454144 	g and pulling test (	n aposito el F Lamb Y		ter capture thank place (h
	per that for 16° color			•		
	<b>?a i</b>		• • • • • • • • • • •	Para A		•
			(Mrs. ()			(Tries Manual Charge)
Piters go	ten for thing rending	d, I personal	to pay to the ord	er of the Lagr		, the observ survivated susses alternate for enfortess of pa
(7t) 13 50 M25 (47 4	y a resonable atternet (FE) per examp	MOTO DOS. SI MOTO DOSE.	not paid at motor	ity, this nate old is no or	deal House	for draw totalent at the published for demands or letters to d
	that may come du	ring with her	ting.			
FT 80720	<b>57</b> :					
					3 0 . 2 .	91: 47
	(Orner of T	(di)	<del></del>	- <b>B</b>	(2)	Well Toront
מייסגינע	<b>57</b> :					
oi-	: B.	h				
0	Corpe Pune	1				1.

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		PROME 103-4004	E PUMPS, INCAL TORRIOR FAMILY PALLS, IDANIO OR IS REPORT AND	P, Q, <b>SQE</b> 600	DEGE DEGE	VED
- 9	eck the	tu	LOCATION		MT	5-20-67
10. Vet .	tord	The Dayle 	d Punp bod?	all of Chaing in W	NI	
Stort Capaci		Stockerps Pi	po to Um	=== c	OL & Longth	
7	Water Lord FL from Top	RPM, ONL	Reading OPM		Remarks — Opending V	Sheld? Felan? etc.
2:00			11250		Sand	
2.05	Broken	shoft	Carpling			<del></del>
9.15	3 88-435		1750		Sandy	
11.72	135'		175		day E	leaning
Lea	445		190	٢	11	11
1:45	445.		190	5	1.	11
\$	er feet for 30° estan Plus 8 Ungs (1st Mr.)	in will be charged A 	stong text pump, 6	Bysolo	but for 6" commits  1 Trini Shado  the above more sittemary for cell	ples 6
APPROVED	BY Course of W	k		s- ag fr		
June 3	offel,	Jane)		•	USGS	7

## LAYNE PUMPS, Inc.



PISTONS THE-COLO.

P. G. SCH. CO. Supportment of Machinesian.
THEN PARES. STAND COMM.

WELL TESTING REPORT AND AGREEMENT					
		LOCATI	. • •		MT 5
سست د من د ه	Well Doyle	_ ,	Amount of	Change to 1	Per
ser Land	· w	15 Wall Pamp S	and?		. 010m bes
erty Hee	Planta	go Pipo to Uso.		<b>&gt;&gt;&gt; «</b>	Oct & Longth
Water Low PL from T		Ortho Restory Inches	OPH.	Name of the last o	Americ - Bank Conning Websit
358- 44	150		19050		Chami
1 445	, 1		1905		11
445	• 1		1815		1,
443			1750		11
ish x c	Kh Eman			}	1
	10 9				·
Plus 8 Setting; (lot price for value su pain completion o ing 6 resemble a cent (8%) per am	ertred, I premies to f well test. I also Morney's fin. If no	Hrs. @ 1	ot over 300".  Plus 6	Byotio Pump, Inc with an	
<b>20 S</b> Y.					
(Owner	of Well)				Po y P/ - 67
				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	

MALL POINT PEN

## Bute of Irako Department of Weter Administration

### WELL DRILLER'S REPORT

State the requires that this report to filled with the State Restance.on Engineer writer. 30 day, other completion or changement of the well,

within 30 day, after complete	or or analysis of the same	_
1 MELL COMER	7. WATER LEVEL Project Service Co. / Patts under land 178 feet better land mertage	
Name along Strategy	Pratty water level 378 feet betow land garless	
	Flowing' - Yes - B No G.P.M. Nov	
AGGERT 955 HORTH TOTH EAST, MOUNTAIN HOME, IDA	Temperature 62 ° F. Quality 8.6.1.	
Come is Person No	Controlled by   Valve   Cap   Plug	
2 MATURE OF WORK	& WELL TEST DATA	
# New well □ Despened □ Replacement	🗆 Pumo 🗷 Bailer 🗇 Other	
Abundance (describe method of strendoning)	Dresharge G P M Brass Down House Pum	
The state of the s	10 16	
3 PROPOSED USE	<del></del>	
■ Domestic _ Irrigation □ (	9. LITHOLOGIC LGG	
	Heate Depth Measured	Vilute:
□ Munic pal □ Industrial □ Stock		Y   100
4 METHOD DRILLED	6 Coppe Co	, I
S Cable □ Rotory □ Dug □ Other	6 19 GREY BASALT	-
	21 37 GREY BASALT, FRACTURED	H
S. WELL CONSTRUCTION	37 41 RED CINDERS	7
Desmenar of hole 6 inches Total depth 106 feet	89 93 CINDERS & TAN BAKED CLAY	
Casaring schedules ## Steel   Concretiv Timbation Driverus From To	93 172 BLACK & GRET BASALT	X
Thusanto Division From To 0.250 inches 6-5/8 inches PLUS Teat 20 feet	122 123 CINOERS	R
mones mones feet _ feet	125 129 RED BURNT CLAY	1
	129 234 GREY BASALT, FRACTURED	X
inches feet feet	238 J 273 SREY BASALT	
Was a packer or well used? Li Yes 18 No	273 279 HEDDIBH-GREY BASALT	
Performent? 🗆 Yes 🗯 No	275 250 GREY BASALT 290 320 RED BASALT, GINDERS 307 4320	1
Mose perforated? C Factory C Knife C Torch Sus of perforation inches by inches	3.20 3.25 2000 2000 2000	1 -
Number From To	325 357 TREY BASALT 357 366 TRANSE CLADERS, SAND & SULT	
perforationsfeetfeetfeet	- +366 - 1/11/1 CREY BARM T	
perforations feet feet	111 1/23 PECY BASALT FRACTURED	
Well stream metalled? ☐ Yes	137 167 GREY BARALT, FRACTIBED	•
Manufacturer's name	107 173 GREY RASALT, MARC	+-
Type Model No	LAG LOT SET HARD	
Desmoter Jot size Set from feet to feet	197 5C2 GREY SOFT	┻╁╌┥
Gravel perhed? ** Yes . No. Size of gravel		•
Placed from feet 10 feet	<del></del>	++
Surface seel? S Yes (2) No. To what depth 20 feet		$\rightrightarrows$
Material used in seat		+-
6 LOCATION OF WELL Shatch map location must agree with written location a	10 Work started UNE 14, 1971 Anached NOV 9, 197	1
•	11 DRILLER'S CERTIFICATION  This well was drilled under my supervision and this report is	,
<b>∤</b> + + + + +	true to the best of my knowledge	•
<del></del>	World All House as to Day to an Business	•
County FLMORE	PO BOX 112, HAMMETT, 10440 53627	
NE SW -10	Hugh Harden Noy 26.	, F1 ,

### REPORT OF WELL DRILLER State of Idaho

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17

State law requires that this report shall Engineer within 30 days efter completion or a	bandonment of the well.
HOLD DECAR T STREETER	depth of well: 35 Standing water level below ground: 372 Tesp. Fahr. Test delivery: gre orcfs Pump? Bail
Address 955 NIDTE	level below ground: 372 rosp.
NAT: Ilani Tila	or c/a Puen?   Beil
Owner's Persit No. 727 25	Size of pump and motor used to make test:
MATURE OF WORK (check): Replacement well	<u> </u>
New well H Despened Abandoned L	Length of time of test: MrsMis.
Vater is to be used for: Specks & Brate	Drawdown: ft. Artesian pressure: ft. above land .urface Give flow cfs
METROD OF CONSTRUCTION: Motary Coble	or gpm. Shutoff pressure:
Dag Other (explain)	10
(explain)	No control Does well leak around casing?
CASING SCHEDULE: Threaded Welded	No control Does well leak around casing? Tes No MATERIAL WATER
20 "Diag. (ros C ft. to 7/ ft.	TOOM SO TO TO TO TO THE TOTAL THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO T
"Diam. from C ft. to 7/ ft.  "Diam. from ft. to ft.  "Time. from ft. to ft.  "Time. from ft. to ft.  Material	FEET FEET
"Mes. from ft. to ft.	16.16.100001
	la 37 Grantage
Steel- concrete  wood  other	37 halpender
	137 Granders
(explain)	75 107 Krang Ad. 0
PERFORATED? Yes No Type of	121 127 Krante Ad. #
perforator used:	13 152 Red -21A
Size of perforations: " by	152 184 SCIWA KAIN
Size of perforations: by perforations from ft. to ft.	ort han bed Larm
perforations from ft. to ft.	225 25 1 hrawa hard
perforations fromft. toft.	257 Min Gray Lava
perforations from ft. to ft. perforations from ft. to ft. perforations from ft. to ft.  VAS SCREEN INSTALLED? Yes No	994 341 led have
	341 376 Grankera
Type Model No.	407 441 Lead Lead 1
Type Hodel No.  Diam. Slot size Set from ft. to ft Diam. Slot size Set from ft. to ft	WIS HIS Gray LANA
Diam. Slot size Set from ft. to ft	463 31) PLACE FACE
CONSTRUCTION: Well gravel packed? Yes	
No. size of gravel Gravel placed from ft. to ft. Surface seal	721 725 Yellow (124)
provided? Yes No To what depth?	721 725 YEVEN CLASSON STREETS NV
ft. Material used in seal:	No.
	! <del></del>
Did any strata contain unusable water? Yes	<del>                                    </del>
He. Type of water: Depth of strate ft. Hethod of sealing	
etrate off:	<del>'A</del>
7-7	
Surface casing used? Yes No.	
Cemented in place? Yes No	
Surface casing used? Yes No. Commented in place? Yes No. No. No. No. No. No. No. No. No. No.	
Cemented in place? Yes No	
Cemented in place? Yes No	
Cemented in place? Yes No	Work started It is a
Cemented in place? Yes No	Work started 16 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Commented in place? Yes No Locate well in section	Work started 10 % Work finished: 1 1 2 Woll Driller's Statement: This well was
Cemented in place? Yes No	Work started 16 % 4. Work finished: 1-1 4. Well Driller's Statement: This well was drilled under my supervision and this report
Commented in place? Yes No Your World in section	Work started 10 % Work finished: 1 1 2 Woll Driller's Statement: This well was
Commented in place? Yes No Locate well in section	Work started 10 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Commented in place? Yes No Your World in section	Work started 10 %  Work started 10 %  Work finished:
Commented in place? Yes No Your World in section	Work started. It is the work finished: - 1 to the work finished: - 1 t
LOCATION OF WELL: County	Work started 10 %  Work started 10 %  Work finished:
Commented in place? Yes No Vocate well in section	Work started. It is the work finished: - 1 to the work finished: - 1 t

State of Idaho

MC 30 1300

State law requires that this report shal Engineer within 30 days after completion or a	bandonment of the well.
WELL OWNER: Base Wayne Reddekopp	Sine of drilled hote:   Total depth of well: 4 7 Standing unter level below ground: 77 Temp. Fahr. Test delivery: gpm
Address RUDORT Idaho	level below ground: 377 Temp.
61.2/89	or cfs Pump? Bail
Owner's Permit No.	Sise of pump and motor meed to make test:
NATURE OF WORK (check): Replacement well	
Now well Deepened Abandoned	Length of time of test: MrsMin.
Vater is to be used for: IRRIC STICK	Drawdown:ft. Artesian pressure: ft.
METROD OF CONSTRUCTION: Rotary Cable [	above land surfece Give flow cfs or gpm. Shutoff pressure:
Dug Other	Controlled by: Valve     Can     Plne
	No control Does well leak around casing?
CASING SCHEDULE. Threaded Welded	Yes No
"Diam. from ft. to ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft.  Thickness of casing: 28/ Material:	DEPTH MATERIAL WATER FROM TO YES OR NO
"Dian from ft. to ft.	FROM TO YES OR NO
"Diag. from ft. to ft.	OH TEP SOLL
Thickness of casing: 28/ Material:	4 16 HARI PAN
Steel concrete wood other	10 40 GRAY LAVA
2 E 1 T 1 T	14011 Red
	61 65 6842
PERFORATED? Yes No Type of	\$9 ICA BRUN CLAY
perforator used:	ICC ILE GRAS hour Scholure Bellion Line
	11x 174 RAMMA LAVA
Size of perforations "by "  perforations from ft. to ft.  perforations from ft. to ft.  perforations from ft. to ft.  perforations from ft. to ft.  Perforations from ft. to ft.  WAS SCREEN INSTALLED? Yes No	174/9/ (. Ray "
perforations from ft. to ft.	136 197 6 Ray
perforations fromft. toft.	19222 GRAY LAWA (HARL)
perforations fromft. toft.	235-146 Bir.
WAS SCREEN INSTALLED? Yes / No	14/2 1/2 6 RAY
Manufacturer's name	172212/21 / Pau
Type Hodel No.	3/3 81/ BRING (Law
Type         Hodel No.           flam.         Slot size         Set from ft. to ft           Diam.         Slot size         Set from ft. to ft	221 264 GR34 LAVA
Diam. Clot size Set from ft. to ft	369 878 BRUNN CLAY
CONSTRUCTION. Well gravel packed? Yes	1778 17944 15 Pan Lau [Hana]
No. size of gravel Gravel placed from fi. to ft. Surface seal	304 395 RROWN
placed from fi. to ft. Surface seal	APERCA LICE
provided: Yes   No   To what depth?	426 427 REGIN
ft. Material used in seal:	457 WES CREWER BLIKK LOCKE
Did any strata contain unusable water? Yes	WESTES DIRTH RISE LUISE 1
Mo. Type of water	
Depth of strate ft. Method of sealin	THE TO GROY CLAY
strate off	PAIR 575 GRay Clay
	<del>              -</del>
	·· -
Surface casing used? Yes V No.	<del> </del>
Cemented in place' Yes _ No _	
Locate well in section	
- 1 · 丁丁 · 丁 <b>天</b> ]	
	Home at a state of the state of
	Work started ky Lang 1966 Work finished In October 1966
الماميل	Well Driller's Statement This well was
· Jec	drilled under my supervision and tile report
<b>▼</b>	is true to the best of my knowledge.
i i	Name Werl Chares
<b> </b>	Address Bubley 11260
<u>, , , , , , , , , , , , , , , , , , , </u>	Signed by Charles
The Artist and Artist County and	License No. 13) Date 1/27-19.
ALC: A MARCHA 19 A TIME A TIME	
NE . 51 13 4 1 5	1

USCS

this will was tested at 515. I dilit produce much water. We drilled and 8. hole for culinary water then went back and despared this one to 578, this clay in the bottom is quite carry this well is to be tested again but hasn't been get.

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UST TYPE IN LITTER OR BALL POINT PLB

CONSTRUCTION OF THE PROPERTY O

## State of Liebs Department of Major Resources

WILL CHILLET'S RIVE SAF				
State his requires but that you'd be hid out the days, . It the completion of	Gregory, Dynamical of Monte & The Williams (1997)  grange or and of the well.			
1. WELL CHARGE LOS. Now Flor more Church	2. WATER LEVEL			
Aum 305 ALTURA' As AL Bone	Floored D Yes (6the GP.St. Eve			
Ourse's Pornix No.	Controlled by D Ve et D Cup CI Ping			
2. RATURE OF WORK	& WELL TEST DATA			
SCHoor and C Desputed C Replacement	DRIVE C BAR C CON			
☐ Abardoned (describe method of shardoning)	Forward (In 19			
E PROPERTO BLY  SCHOOLSE C brighten C Ret C Charlently find				
<b>,</b>	to the same of the			
☐ Managed ☐ Industrial ☐ Each ☐ Thirty Dispersal or histogram	Com From To			
4. METHOD CRILLED	6 9 7 6 9 1 7 6 7 1 6 7			
Casto SCROSON COM COM				
6. WELL CONSTRUCTION	6 97 92 12 1/1 6 92 1/2 6			
Displace of hair & inches Total depth 500 fact				
Coming schedule: (2:55ml) [] Conordia				
250 hour 6 hours has 20' has				
inches inches test test	6 1-4 224 Desc			
inches lect	6 224 2-0 NO /			
inches inches feet				
17 or a packer or sees used? C) Yes 77 No. Perforated? C) Yes 77 No.				
How performed?     Factory				
Number Prop To				
perforations fact feet				
perforetions feet feet				
Well screen invasibal? U Yes Gifte Manufacturer's name Type				
Type Moule No Set from four to fo. 1				
Devictor Stat date Set from fact to *				
Grand punted! () You JETto Star of grand.				
Placed tremfact tofact				
toran one care Control and a set	<del></del>			
© Pottling day of Tail curings forting presenting uses □ Story of □ Temperary curings consum-				
Contro to and age				
& DOCATION OF MINL	West started English Startes			
Block map location must agree with written incetion.				
6/	IL BRILLES COURS TO			
0.00 mm	no moderate			
	mm Las Al			
	Signed by (Pivo C're M.			
com Elman	<b>and</b>			
NA NHINER 15 T. 4 M & 5 PM	Die 14			
The state of the s	Many Tary to Til			

USE TYPEWRITER OR BALL POINT PEN

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### State of Idaho Desertment of Weser Administration

### WELL DRILLER'S REPORT



have less requires that this report be filled with the State Reclamation Engineer

within 30 reys offer comple	tion or abandoriment of the well.
1. WELL CHNER	7. WATER LEVEL
Name THEOREGAE N. PETTINGILL	Static water level 369.7 feet federal level agricum
Addres MOURTAIN HOVE, IBAHO	Temperature £87 <sub>60</sub> F. Chastry #000 Artissen closed in pressure
Owner's Permit No.	Controlled by   Valve   Cap   Plug
2 MATURE OF WORK	A. WELL TEST DATA
■ New well □ Despend □ Replacement	□ Purino El Sailer □ Other
Abandoned (describe method of abandoning)	Desharps G.F.M. Braw Deam Hours Funged
	10 LESS THAM 3 LINCH
3. PROPOSED USE	
■ Domestic 🖸 Irrigation 😂 Test	1. LITHOLOGIC LOG PAGE / OF Z PAGES
🗆 Municipal 😅 Industrial 😀 Stock	Hote Dooth Meanus Wester Doom From To Meanus Vos No.
4 METHOD DRILLED	3° 0 2 ROCKY 3011 X
T ME INCO DUICEED	7 19 GREY BASALT FRACTURED
Cable	[6°] 199 . 26 ! • _ •
& WELL CONSTRUCTION	26 26 CINGERS
150	3° 12 RED BURNT CLAY
Diameter of hole 6 inches Total depth 450 feet Casing schedule State □ Concrete	
0.50 inches 6.65 inches PLUS 1 Hert 15.7 feet	16 59 SHEY RASALT FRACTURED
0-50 inches 6-63 inches PLUS I offer 15-7 feet	
inches feet feet	1 . /- 1 . //
inches inches feet feet	78 1 109 DENSE GREY BASALT
inches inches feet feet	139 111 RED BURNT CLAY X 111 120 GREY BASALT, MEDIUM DENSE X
Was a packer or east used?   Yes  No	120 122 RED BURNT CLAY
Perforsted?	122 133 GREY BASALT, WEDIUM DENSE
Si, of perforation inches by inches	12 17 COEY BARALT MENUN DENES
Number From To gerforetone feet feet	157 156 " DENSE(HARD)   X
perforations feet feet	167   147   2000   Cimpens
perforations feet feet	162 : 198 GREY BASALT, WEDILM DENSE   x
Well screen installed? ☐ Yes ■ No	198 202 . WEN SCYT, SCORIAG X 202 213 . WEND DENSE X
Manutacourer's name Type Model No	213 229 Only Basalt, MEDIUM, CINDERS AT 213, 217, 227 x
Dumeter Slot size _ Set from feet to feet	213, 21 227 x
Duameter Stot size Set from feet to feet	242 247 GREY BASALT MEDIUM DENSE I
Gravet packed? Yes # No Size of gravet	247 20 BLACK BARALT, QUITE DENSE   X
Placed from feet to feet	362 279 200 - BASALY VERY DENSE
Surface seel? W Yes. 1. No. To what depth 19+7 feet	I 1279 285 LRED RUMMY CLAY   1 x 1
Material wand in seel .   Coment grout . Puddling clay	285 2-2 RED RABALT MEDIUM PENEL B
& LOCATION OF WELL	295 172 REC RUNNY CLAY
Statch may location must spree with written location	10
•	Work started finished
	11 DRILLER'S CERTIFICATION
	This well was drilled under my supervision and this repair is true to the best of my knowledge
	2 20 13 the seat of the angular
Constant Constant	Service LOLITER NUMBER
A	According to
. A'f A Sec T . ANS R . EAN	Septem St. Date
•	

UM TYPEWRITER OR BALL POINT PEN

### State of Idaho Department of Water Administration

### **WELL DRILLER'S REPORT**

State four requires that this report to filed with the State Resignation Engineer within 30 days after completion or ebendonment of the well

Andrew 30 days area complete				
1. WELL OWNER	7. WATER LEVEL STORY OF THE STO			
Name THEROPE H. PETTINGILLPAGE 2	Static work lovel fort below land ourloss			
	Flowing?			
	Arresian closed-in pressure			
Owner's Permit No	Controlled by D Valve D Cas D Plus			
2. MATURE OF WORK	8 WELL TEST DATA			
☐ New well ☐ Despend ☐ Replacement	□ Pumo □ Bailer □ Other			
Abandoned (describe method of abandoning)	Originarys G P M Brow Down House Fungasi			
_ Aggregated (describe method of spandarmy)	<del></del>			
	<u></u>			
1 PROPOSED USE				
	A LITHOLOGIC LOG			
□ Domestic □ Irregation □ Test	S LITHOLOGIC LOGPASE 2 OF 2 PASES			
	Hote Dooth Masseul Vos No			
4 METHOD DRILLED	6" 302 325 BLACK BARALT, GENEE #			
!	330 340 RED BURNT CLAY			
☐ Cable ☐ Rotory ☐ Dug ☐ Other	1340 1349 BROWN CLAY			
	349.36   BROWN BASALT, MEDIUM DENSE   X			
8. WELL CONSTRUCTION	356 365 VERY DENSE X			
Diameter of hole inches Total depth feet	36 372 GREY BASALT, VENY DENSE X			
Casang achadule   Steel   Concrete				
Thighness Dismeter From To	373 377 BLACK BASALT, MEDIUM DENSE X 377 377 BENTONITE X			
inches _ , inches feet feet	177 190 SCORIAE, VERY SOFT			
feet feet	350 385 GREY BASALT, MEDIUM, FRACTURED			
, inches feet feet	385 392 BLACK BASALT, DENSE			
inches feet	392 397 RED SCORIAE H			
	197 402 HARD BLACK RUBBLE, OR TALUS X			
Was a pecker or real used? ☐ Yes ☐ No				
Perforated?	107 120 SCORIAF BLACK BED TAN			
How perforated?   Factory   Knife   Torch	L20 L27 . MEDIUM SOFT			
Size of perforation inches by inches	L27 L50 GREY BASALT INCREASING			
Number From To feet feet	MARONESS FROM MEDIUM SOFT			
perforations feet feet	TO HARD X X			
perforationsfeetfeet				
	<del></del>			
Well screen installed?   Yes   No				
Manufacturer's name				
TypeMadet No Diameter Slat sizeSet fromfeet tofeet				
Diameter Slot eize Set from feet to feet				
	<del></del>			
Grevel packed? C Yes C No Size of grevel	<del></del>			
Placed from feet to feet				
#				
Surface exal? C Yes C No. To what depth feet Meteral used in seel 11 Cement grout (1) Puddling clay				
To the state of th				
6. LOCATION OF WELL				
Statch map location must agree with written location				
M	10 Work started MAR 11, 1972 finances APRIL 26, 1972			
	Working Co. 31 312 more Park Int. (11)			
· · · · · · · · · · · · · · · · · · ·				
• · · · · · · · · · · · · · · · · · · ·	11 DRILLER'S CERTIFICATION			
	This well was drilled under my supervision and this report is true to the best of my knowledge			
1 1 1 1 1 1	nde in me peri oi mă su <b>omană</b>			
<del></del>	Manual Annual Control Control			
	MOUNTAIN HOME WELL DRILLERS By Delton side Firm's Name			
County	P U. BOX 112, HANNETT, 1044- 53077			
	A			
. 'SEE T N/S.R EW	Hough Harden 2 Charles.			
	Nation of Page 1981			

## State of Idaho Desgrapost of Water Administration

### WELL DRILLER'S REPORT

RECEIVED No. 19

State two requires that this report to william 30 days after earnife			<u></u>	de est	0 127:
TO THE OWNER.				Department of the	
War Hereen					
N of city MT. Home Ida	] ;				
Count's Ferrit No.				0 Van 0 000	,
& MATURE OF WORK	4.	FELL TI	MIT DA	TA	
C Name and CK Occupant C Registrations	١,	) A-mp		D Baller C Other	
Algorithmas (describe mathed of disordering)			DE.		
	二				
1 PROPOSED USE	仁				
.,			<b>.</b>	~	
C) Dernuts: 40 Irrigation C) Test		LINOF	) (Cont. )		
D Municipal C Industrial C Steek		r			
4. METHOD DRILLED	12			Tight hole Tan clay	H
Ē Cable □ Ratery □ Dug □ Other	1	492	533	black lava hard dark brown lava	国
& WELL CONSTRUCTION			_	gray lava	
Diameter of hoto 12 inches Total depth <u>#95</u> last	}			sandy clay blue clay & sand	
Cusing spheriule:     Seed     Constable   Thispines   Statement   From To		590	603	black lava & clay	7.
inches feet	1			blue clay & pea grave clay & sand	
	ļ			fine gray sand some copink clay & boulders	:lay
hate hat hat	Ł	663	670	bentonite & gray sand	, <u>H</u>
Was a papelor or other used?   □ Yes □ No	-	670	695	gray clay clay	<del></del>
Performed?   Yes   No   How performed?   Factory   Knife   Torch	F			hole filled back to 6	560
Size of parferences inches by inches From To	<u> </u>	·		<del></del>	
perforesters feet feet					
performance feet Net					
Well cores installed?					
Type Medal No	L				
Diameter Stat size Set from feet to fe					
Gravel pucked?   Yes   No Stan of gravel	F				$\overline{}$
Pleased from feet to feet	F				
Burton unit?  Yes	$\vdash$				=
& LOCATION OF WELL					<u> </u>
Shotch map leastlen must agree with written leastlen.					
<u> </u>		tert re-		6/17/± 6/2	9 77
<b>├</b> ╌╬╌╬╌╬╌	11. DRILLER'S CERTIFICATION				
	·	This wall	-	illed under my experiedan and this of my knowledge.	-
	[	DIC	k Jo	tnson	,
•	C.L. Middleston 4 Son 35				35
cam bliver	1 -	Pl.	<u>افا يـــــــــــــــــــــــــــــــــــ</u>	UN 6'0 0 ML. Home Id	
SKUSKUM 16 1. 3 AR. R. S. and	ĺí	Kon.	7	13/1	777-
	,				

USE TYPEWRITER OR BALL POINT PEN

### State of seaso Department of Water Administration

# RECEIVED

### WELL DRILLER'S REPORT

days after the completion or	r star comment of the well	~ <u>~</u>
1 WELL OWNER	WATER LEVEL	.
Name Pate NEVSEN	for below land surface	
	Flowing? C Yes B No GPM flow	
Accords TTT Its more	Femperature F Quelity Antesian closent in pressure 0.51	-
- Ounge informative in the second of the sec	Controlled by C. Valve C. Cap C. Plug	
2 NATURE OF WORK	B WELL TEST DATA	
Milhen well Coopened _ Replacement	1 Pumo 5 Bailer 2 Other	
i Abandoned -Jescrite method of abandoning!	Desharps G P M Bran Bours Heavy Purse	2
	20 8	
The same of the sa		
3 PROPOSED USE		
☐ Commerce ☐ Imagellan ☐ Tool ☐ Other basedly had	9 LITHOLOGIC LOG	
Industrial   Stock   Visite Deposed or Injection	Dierr From Te Maserial Vo	n No
4 METHOD DRILLED	05 13 40 Geoglas Broken	
1	5 40 65 Rail Lang "	
Cable # Rutory D Dug C Other	8 65 20 GRAY SAUS "	4
5 WELL CONSTRUCTION	8 74 KC GREY LAUA	
Carrieties of hole 8, inches Total depth 500, feet		<del></del>
Case y schedule (\$4. Steel   Concrete	8 185 500 NJ pat-an	
Thickness Describes From To test 250 inches 8 inches 1 heat 20 heat		4
teri		+
inches	·	
inches feet		
Was a pack or no seek used? Yes \$50 No		<del>-</del>
How sertorated?     Factory     Knife       Torch		+
Size of an horistion inghisting inchis		$\overline{}$
perforstrans feet feet		
perforetionsfeetfeetfeet		
Well screen installed?		
Type Model No	<del>                                     </del>	+
C never Stor size Set from feet to feet		
		+-
Pa 1 from feet to feet to		<del></del> -
		<u> </u>
Turkey and auth 20 Manual stad in sool   Compan grow		1
The product of the pr		<del>-</del>
D Overbare to cost depth	<del>}</del>	
	14.	
SLOCATION OF WELL SLOTE map location must agree with written lecessor.	Work started >15:24   Invehed >-33-75	
and the second of the second s	IL DOLLERS CETTYPOSTOR	
	me we Kiddlocker Da May my	اسدد
**************************************	40.	<u>ت</u>
	man A) Hong	·>•
	same by (Pro Others) C. L. Theddleston	د ا
Elmene	- 1.1	
100	Decision -	
NE NE WE 18 14 BER S EN		

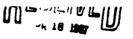
į

WELL DRILLER'S REPORT on that this report to files with the Director, Department of

	_							—
7 METT CAMES	7.	WATE	IR LEV	re L				- 1
we Wiley Fisher					7 feet Jelon II			
Admi 5051 Mtn View Dr. Boise, ID	Flowing? Yes Me No. G P M Flow Artowari closed in pressure p.5.1.							
Owner's Permit Ne.	Controlled by 1 Valve U Cap ( Plus Temperature 7/ of Ou lity Good						f	
2. NATURE OF WORK	•	WELL	1687	DATA	No Test			_
Filter well (1 Despared   E. Replacemen	:		unt.		• •	Other	<b></b> .	
☐ Abandoned Ideacribs method of abandoning.		*****	- G + 4.	$\Box$	Pumming Lauri	140	Permission	`
	1					1		
3. PROPOSED USE								
<b>■ Demestic</b> C trrigation © Test © Municipal	0.	LITH	OLOGI	c roe				
☐ Industrial ☐ Stock ☐ Waste Disposel or Injection ☐ Other ☐ Specify type!	Hete		To.		Mesonal		<b>9</b> 0	7
	10	0	18					
4 METHOD DRILLED  ## Reserv   Air   Hydraulic   Revenue rotary	8-	18	453				$\pm$	$\Box$
Cable Due Coner		9	3	Topes	la . m	-		[]
8. WELL CONSTRUCTION			325	عاسون	or Barre Mary	-d		10
Casing schedule: # Seret   Concrete   Other	•	375	361	Backe	leculation) ~ Hound } held /9	(me		‡- [
Trackress Diameter From To	}	361	428	Bran	Add 16	_لڪ <sup>تر</sup> ڪ اوميمال		j
inches inches feet feet		428	444	754	90 95		<del>-   -</del>	+
inchesinchesfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeet			-	St.	ب منطقي			-
Was casing drive shoe used? ☐ Yes			1 - 1	·			$\Rightarrow$	$\Box$
Perforeted? ☐ Yes ☐ No			[ - ]			·		+
Here perforated?   Fectory   Knife   Torch Size of perforation Inches by Inches	-	-		- 4	LE ELL	ALS!	<b></b>	$\vdash$
Number From To perforations feet feet	1	·	: ;	1				$\Box$
perforations feet feet feet	_		- 1	<del></del>	SEP 23	:975 <u> </u>	- + -	口
Well screen installed? C Yes & No	ł			-	December of Male	(ysources)	<u> </u>	1-1
Manufacturer's name			1		Me tera Lagran			+
Diameter Stot size Set from feet to feet Diameter Stot size Set from feet to feet	-		- 1				-	
Gravel packed? ☐ Yes ☐ No ☐ Size of gravel  Placed from feet to feet		-					- ‡	$\Box$
Surface seel depth /5% Meterial used in seel: Ef Coment grout								$\pm$
Besting procedure used:   Ruddling clay   Well cuttings   Sturry pit   Temp, surface casing	}				<u>-</u>		- +	$\{-\}$
SF Overbore to real depth  Method of joining casing: □ Threaded □ Welded □ Solvent		- 1			Laxina H	C POST	<u> </u>	曰
J P,e.c.e Weld  □ Committed between strate					··· · <i>-</i>		<u>-                                    </u>	耳
Describe access port	10.	Wo	nk W	w 8/2	/22 1000	· zhi	/z: <u>'</u> _	_
6. LOCATION OF WELL	11.	DRIL	LERS	CERTIFIC	ATION	·		
Sheeth map recetion must agree with written location.					inimum well cons		nder is w	~
S. Intelan Name	complied with at the time the rig was removed.  Gailey Drilling w							
Elmone County	Firm Name Talance Co. Firm No. 27/							
Log No. & Stone No.		Addre		4 4	TO AL	Date 4/13	5/71	1
		Sugner	toy (F	rm Officia	1/20N	سيعلم	_	_
comy Elinate County				end Ones en l'é	£1		, ·	
NE . ME DE 14 T Y NON 5 CM			'	- <del>                                     </del>	rya.	7.44	ን	
يمرين كالمراقب والمراجعين والمراوي والمراجع والم		22.2			TO THE DESAR			

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### EPOST OF Wall DEILLER

PROCESS SANDANIE CONTROL

nahan material of Mecleticages

Engineer within 30 days after completion or a	bandonment of the well.
WELL OWNER Tacket	Size of drilled hole: /2 Total depth of well: 494 Standing water leve; below ground: 723 Temp. Fahr. Test delivery: Spe or cfs Pump? Bail Size of pump and motor used to make test:
Address Linear Fall: nevitina	level below ground: 723 Temp. Fahr. * Test delivery: green
	or cfs Pump? . Sail
NATURE OF WORK (check): Replacement well  New well Deepened Abandoned	
	Length of time of test: Rrs. Mis. Drawdown:ft. Artesian pressure: ft.
Water 1s to be used for Lyung Tory	labora land sunface Give flow eff
METHOD OF CONSTRUCTION Rotary Cable Dug Other explain	or gpm. Shutoff pressure: Controlled by: Valve Cap Plug
TA. T. KR.M.LR. Thresded Welded	Yes No Control No Cont
Ther. from ft. to ft.  "Ins. from ft. to ft.  "Diam. from ft. to ft.  Them. from ft. to ft.  Thickness of casing: Haterial:	DEPTH MATERIAL WATER FROM TO YES OR NO
"Dies. froe ft. to ft.	FEET FFET
ft. to ft.	432 463 sec, lera
Steel concrete wood other	463 467 11 " Nord 467 477 " "
Steel Courselete C appg C other C	472 484 146 164-
(explain)	unu 119: Meint france
PERFORATELY Yes No Type of	
perforator used	
Site of perforations: "by "  perforations from ft. to ft.  perforations from ft. to ft.  perforations from ft. to ft.  conforations from ft. to ft.  NO TALEN INSTALLED? Tes No	
perforations fromft. toft.	
perforations fromft. toft.	
WAS . REEN INSTALLED? Yes No	
Type   Model No. Diaz. Set size Set from ft. to ft Diam. Slot size Set from ft. to ft	<del></del>
Diam Slot size Set fromft. toft.	
CONSTRUCTION Well gravel packed? Tes Cravel No. Size of gravel Gravel place: rox ft. to ft. Surface seal provide: Ver No To what depth?	
No. sire of gravel Gravel	
provide: Yer N. To what depth?	
ft. Material used in seal:	
hay strate contain unusable water? Tes	
No. Super of water to Method of sealing ft. Method of sealing	
strate off	
Surface to the used? Yes #1 No.	
Durince to the used? Yes et No. Deserted to clace? Yes No.	<del></del>
.ocate well in section	
,	- <del></del>
	Work started (1977)
ا	Well Driller's Statement Tis well was
	drilled under my supervision and this report is true to the best of my knowledge.
	Name DAL / CILITAR
	Address / Law 241 W. South Control of
	agned by de C
Add to the secon	license No. 343 Date SMALL IN
AW - SW - F. 17 T. U D/C R. C E/C	

WELL LOG AND REPORT TO THE STATE RECLAMATION ENGINEER OF DABO on C 31 830 was no comp Elline The death to standing years from the ground 123 Whate toma

NWEW S.19 YS SE

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DRITTLED FOR IL W. FINIER

Date	Startod: Sater:	25 Oct 6	<b>5</b> :
7irst	.inter:	323 foot	<b>:</b>

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Date Completed:	1. 7	44
		$\sim$
Jater Stanta:	3.23	
THEOR SUR: THE	3.03	

TICHTUDE OF SITURA	FORMATION	TOTAL
/6"	Topsoil	2
<b>2-</b> 7	Boulders	5
7-28	Brown Lava	21
28-43	Red Lava	15
43-68	Brown Lava	25
68-8h	Cinders (Red)	16
و مبالا	Gray Lava (Hard)	9
93-108	Cinders (Red)	15
108-117	Brown Lava	9
117-138	Gray Lava	21
1.38-154	Red Lava	16
154-166	Gray Lava (Hard)	12
166-187	Cindera	21
187-193	Gray Lava	6
193-208	Brown Lava	15
208-227	Gray Lava (Hard)	19
227-238	Broken Crevices	
	(Gray Lava)	
238-249	Hard Crevices	
	(Gray Lava)	11
<i>2</i> 49–263	Brown Lava	14
263-277	Gray Lava	14
277-294	Gray Lava (Crevices)	17
294-321	Gray Lava (Hard)	27
<b>23</b> 1-337	Brown Lava (First Water)	16
337-35i	Cinders (Lost cuttings)	14
351-367	Cinders	16
367-385	Red Cinders	18
385-424	Black Lava	39
L 24-429	Brown Sandstone and	
7-, 1-,	Black Lava	5

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NWSW 5,19 48 58

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=	-	Type of Material	1	
0	2	Top Sail	ļ	
	7	Boulders		
	28	Brown leva		
28	43	Red lava	-	
		Brown / ava	<del> </del>	
68	84	Cinders (Red)		
84	93	Gray lava (Hard)	╄	<b> </b> -
93	108	Cinders (Red)	<del></del> -	<u> </u>
108	117	Brown lava	<del></del>	<b> </b>
117	/38	Gray Lava		
/38	154	Red leva	<del></del>	
154	166	Crray Java (bard)	+	<b>├</b>
166	187	Craders	<del></del>	<b>-</b>
187	193	Gray/ara	<del></del>	<b>├</b>
193		<del></del>		<b>-</b>
208	227	Gray lova (bard)	+	
277	238	Gray lava- Broken Crevices		<del> </del>
		If more opens is required use Shoot No. 2		

### WILL DELLER'S STATEMENT

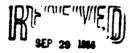
This wall was drilled under my superv	islan and the above information is complete, tree and correct to the best
ay haveledge and builtef.	Mary. Laiking
2/15/6h 1	Marrie No. 235
a/15/66 W	Soil Driller's Helper

B.// Gailey

		WEAL LOO				
ı	2	Page of Manufal	Adding Nam			al.
		•	•		11,	3!
238	149	Hard Grey lava Cievices				
249	263	Browntern			ļ	
263	277	Gray leva			_	
277	294	Graylara Crevices				
R94	321	Gradlava (Hard)			ļ	
321	337	Brown lava GiasTwater		ļ	4-5	
337	35/	Cenders lost entrings			<del> </del>	
351	367	ciadens /		<u> </u>		
367	385	Redcinders				
385	424	Black luva			ļ	
424	429	Brown Sandatone . BK. hr			<b></b>	
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1		NNSW 5.19 45				

	עם שני אני ווו
R. Ramsey REPORT OF W	
ftate law requires that this report shal Engineer within 30 days after completion or a	
WILL OWIER: RULON, Ramsey	Size of drilled hole: 10" Total depth of well: 10 Standing water
Address / Town	depth of well: 4 44 Standing water level below ground: 4 77 Temp. Fahr. Test delivery: gpm
RUPLAT Idahn Owner's Persit No.	or cfs Pump? Bail Size of pump and motor used to make test:
NATURE OF WORK (check): Replacement well	1
New well Despend Abandoned	Length of time of test: Hrs. Min. Drawdown: ft. Artesian pressure: ft.
Water is to be used for:   PR   G atten	above land surfaceCive flowcfs
Dug Other	Controlled by: Valve   Cap   Plug
CASING SCHEDULE: Threaded Velded	No control Dose well leak around casing? Tes No MATERIAL WATER
Jo "Diam. from o ft. to Jo ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft.	DEPTE MATERIAL VATER FROM TO YES OR NO
"Diam. from ft. to ft.	FEET FEET
Thickness of casing: 18/ Material:	O 7 TOP SOLL
Steel Concrete wood other	7 20 Hari Par 30 38 G Ray La Va 28 50 Red
	150 1741 CALL
(explain) PERFORATED? Yes No Type of	90 III GRay
perforator used:	111 115 Brawnish Red 115 142 GRZY
Size of perforations: "by "	142 168 RIACK SOME LOSSE FOR K
perforations from ft. to ft.	165 225 GRAY 225 230 RROWNISA
perforations from ft. to ft. perforations from ft. to ft.	130 154 GR2V 254 258 BROWNS 6 Red
VAS SCREEN INSTALLED? Yes No	158 174 GROV CRELICEN HARD
WAS SCREEN INSTALLED? Yes No Language No Language No. Model No.	124 129 RREW N 128 101 GR24
Diam. Slot size Set from ft. to ft. Diam. Slot size Set from ft. to ft.	1201 lang Require / ava distince actions
CONSTRUCTION: Well gravel packed? Yes	RS3 RAGUMSA ROL
	RLO SEE GRAY SMYCRELICES VES
provided? Yes No To what depth?	CHO WEST ' MORE CREVICES VERS
ft. Material used in seal:	413 480 GROV 17 480 485 RPOWN HIRTY ROCK ?
Did any strat contain unusable water? Yes	185 5 H RREWALL GRAP "SN - SAND YOUR
No. Type of water: Depth of atrataft. Hethod of sealing	L DOMA AND SOME SHALL I
strata off:	OR CLAY + SAND TON
	This is A Good Pock hole
Surface casing used? Yes No. Cemented in place? Yes No	The ROCK Was NOT VERY HOTE
Locate well in section	HUTY where The water but
	And Should Yield Marie
	Work started: 10 Line 1911 Work finished: August 1914
Sec	Well Driller's Statement: This well was drilled under my supervision and this report
	is true to the beat of me knowledge.
<b></b>	None West Chester
	Address: Pt. = 2 Bushy Idah.
L <del></del>	Digned by: SOM w License No. 137 Date: 110005 PM
LOCATION CF WELL: County	

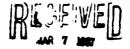
USGS



### REPORT OF WELL DESILER State of Idaho

State law requires that this report shall be filed with the State best administration and the state of the state of the sell.

WELL OWNER: Rome Balon Sereey	Size of drilled hole: 18 inch Total depth of well: 543 Standing water level below ground: 377 Temp.  Fahr. Test delivery: gpe or cfs Pump? Bail
Address the 2 to 10 to 1	level below ground: 377 Temp.
Address 200 E. Baseline Ed. Runert, Idaho	Fahr * Test delivery:
	orcfs Pump7 Bell
Owner's Permit No. 33790	Size of pump and motor used to make test:
MATURE OF BOKK (SEASER): Represented and	Length of time of test: Hrs. Hin.
New well I Deepened Abandoned I	Drawdown: ft. Artesian pressure: ft.
Water is to be used for:	above land surface Give flow cfs
METROD OF CONSTRUCTION: Rotary Cable X	above land surface Give flow cfs or gpm. Shutoff pressure:
	Controlled by: Valve   Cap   Plug
CASING SCREDULE: Threaded Welded  C' "Diam. from oft. to ft."  "Diam. from ft. to ft."  "Diam. from ft. to ft."  "Diam. from ft. to ft."  Thickness of casing: 201 Material:	Controlled by: Valve Cap Plug No control Does well leak around casing?
CASING SCHEDULE: Threaded Welded	Y•. No _
20 "Diam. from 3 ft. to 20 ft.	DEPTH MATERIAL WATER
"Diam. from ft. to ft.	FROM TO YES OR NO
"Diam. fromft. toft.	FEET FEET
"Diam. fromft. toft.	) 7 top soil
Thickness of casing: Material:	7 20 hard nan
Steel 🗵 concrete 🔲 wood 📄 other 🛄	20 30 spay laza
	38 50 rad laws
	50 75 cray law 75 50 heren law with clay string
PERFORATED? Yes No Type of	
perforetor used:	9 111 gray lava 111 115 browish rat lava
•	115 142 Fray lava
Size of perforations: "by	142 1th black lavasame lange rock
perforations from ft. to ft.	164 205 Fray Jam
perforations from ft. to ft.	225 230 browniah
perforation from ft. to ft.	230 212 cra y lava
Size of perforations:  perforations from ft. to ft.  perforations from ft. to ft.  perforation from ft. to ft.  perforations from ft. to ft.  No J	254 258 promise red
WAS SCREEN INSTALLED? Yes No 1	258   274   Fray lava acceptions & hard
Manufacturer's name	274 278 brown
Manufacturer's name  Type Model No.  Diam. Slot size Set from ft. to ft.  Diam. Slot size Set from ft. to ft.	27- 301 era y lava
Diam. Slot size Set from it. to it.	30 3t3 gray lava
DIAMSIOC BIZESec 1908	353 362 promise red
CONSTRUCTION Well gravel packed? Yes 🔲 🗀	353 252 bromist red 352 298 cray lara No
No. I size of gravel Gravel placed from ft. to ft. Surface seal provided? Yes No To what depth?	349 440 brown lava-some gravices Yes
placed from ft. to ft. Surface seal	440 453 brown lavamore cravines Yes
provided. les No To what cepth:	4AT 4H) Cray lava
ft. Material used in seal:	440 495 Prown dirty rock
Did any strata contain unusable water Yes	485 514 Prownish cray-some sand Yes
No. I Type of water	514 543 gray claysome rock
No. 1 Type of water Depth of strata ft. Method of sealing	Sand and some small gravals.
strate off	· · · · · · · · · · · · · · · · · · ·
	sandstone. This is a mod
	rock hole. The rock was not
Surface casing used? Yes x No.	very loose or carey. The rock
Cemented in place Yes No 🔽	it was cracked and ereriew and
Locate well in section	stall yell water
:	
1	Work started 19 una 1955
	Work started 10 June 1985 Work finished 10 Au 1985 Well Driller's Statement This well was
	Well Driller's Statement This well was
200	drilled under my supervision and this report
	is true to the best of my knowledge.
	Name
	Address Fosts # 2 Parteys States
	Signed by
· -4	License No. 127 Date 2 At. 14:
LOCATION Or dELL. Jounty	The state of the s
2 A 2 A Sec. 24 7. 4 1/5 R. 5 E	•
—	HCCC
Jae other alde for	additional remarks USGS



# REPORT OF WELL DRILLER State of Idaho

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Department of Nacionalities

mp and motor used to make  time of test: Hre.  ** ft. Artesian pressure  surface Give flow  Shutoff pressure:  by: Valve Cap Plu  No  MATERIAL	test:  Mis.  of s
Test delivery:  cfs Pump?	test:  Mis.  if t.  cfs  casing?  WATER YES OR B
time of test: Mrs.  75 ft. Artesian pressure surface Give flow  8. Shutoff pressure:  1 by: Valve	Mis. ift. cfs casing? WATER YES OR B
time of test: Mrs.  75 ft. Artesian pressure surface Give flow  8. Shutoff pressure:  1 by: Valve	Mis. of ft, of s casing? VATER YES OR B
ft. Artesian pressure surface Give flow Shutoff pressure: by: Valve Cap Plu Does well leak around No	of of of other parties of the partie
ft. Artesian pressure surface Give flow Shutoff pressure: by: Valve Cap Plu Does well leak around No	of of of other parties of the partie
Surface Give flow Shutoff pressure: by: Valve Cap Plu	creating? VATER YES OR B
Shutoff pressure:  by: Velve Cap Plu	casing?
No MATERIAL  Clay & Lova Lova + Clay Prev Lava Prev Lava Red Lova and agh  From Ulay Prev Material Red Lova and agh	WATER YES OR D
MATERIAL  Clay t Lova Lova t Clay  Tray Lova  Pray Lova  Red Lova and agh  Prove Ulay  TRY way	YES OR P
MATERIAL  Clay t Lova Lova t Clay  Tray Lova  Pray Lova  Red Lova and agh  Prove Ulay  TRY way	YES OR P
Clay & Love Love + Clay Prov Love Prov Love Rod Love and agh  From Ulay Prov Mary	
Cley & Love Love + Cley Topsy Love Topsy Love Red Love and agh Town Ulay Top ways	Nr.
Leve v Clay  Frey Leve  Tray Lave  Red Leve and agh  From Vlay  From Vlay  From Vlay  From Vlay  From Vlay  From Vlay  From Vlay  From Vlay  From Vlay	
French Lave  Frenc	
French Lave  Frenc	
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Promit Ulay PRV MRTO	
Promit Ulay PRV MRTO	
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ted Lave and ash	
her Leve and ash	
Pray Lava	
FET 45 78	<del></del>
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rown Clay sa' Lava	
ross flay sa' lara graval	
Ross Clay	<del></del>
ed June 15, 1966	<del></del>
hedlamary 6. 1967	
or's Statement This well	
	•
lehard de Johanna	
Rt & Rupert, Idaho	
R & Rupert, Idahn  Lichter To Jacobs	
Rt & Rupert, Idaho	1.45
	Arran Clay  Aray Lama ted has b. 1900  Lahed Jamary 6, 1907  Lier's Statement This well ander my supervision and th to the best of my knowledge  Richard 6, Johnson

( ^ ver )

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Drilling was stepped at 530 feet and well tested dry. Drilling was resumed and well was tested at 616 and was dry. Well was drilled to 625 feet where and saveins have prevented describing without easing. Drilling was stepped February 28, 1967. Further crilling is enticipated latter.

# EGENED!

### REPORT OF WELL DRILLER State of Idaho

State law requires that this report shall be filed with the State Beclassifichm, Engineer within 30 days after completion or abandonnent of the well.

Marke Reade Kopp	Size of drilled hole: Total depth of well 500 Standing water level below ground: 755 Temp.	_
Have May Ne Acode ACPP	hepth of well 3 47 attaching water	)T
Address Rupert Idaha	Teast peroa ground: 3 % % ramb.	
	Fahr. Test delivery: or cfs Pump? Bail Size of pump and motor used to make to	
	or the running to make the	
Owner's Permit No.	Size of bomb and motor case to make te	,
MATURE OF WORK (check): Replacement well	Length of time of test: Krs.	W1 -
New well Deepened Abandoned	Drawdown: ft. Artesian pressure:	·;;===
Water is to be used for: CULINGRY	above land aurface Give flow	
METHOD OF CONSTRUCTION Rotary Cable Z	No. Chute Contract	,
METHOD OF CONSTRUCTION ROTARY CASTS &	or gpm. Shutoff pressure:  Controlled by: Valve Cap Plug	<del></del>
Dug Other (explain) CASING SCHEDULE: Threaded Welded	Controlled by valve Cap Fing	201757
CARTHE COMPONER - Walded	No concrete Dove well leak around to	
8 "Dies. from 6 ft. to 4 ft.	No control Does well leak around of the Depth Material	MATTR
	FPOM TO YE	CS OR BC
"Diam. from ft. to ft.	FEET FEET	<del>~ ~ ~ ~</del>
"Diam. from ft. to ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft. Thickness of casing: 147 Material:	A / TAO FALL	<del></del>
The property of the property o	\$ 17 17 ED 3072	+
INICKNESS OF CARING	Z X HARA PAR	+
Steel 🏗 coacrete 🔚 wood 🚍 other 🔲	A E Charance Cona	+
	La las Char Lake	+
	7 7 7 8014 1 3 Hard Fax 3 6 GRay Lunc Laka 1 21 GRAY LAKA 2 7 78 RAY LAKA 7 7 7 7 60 60 60 60 60 60 60 60 60 60 60 60 60	+
PERFORATED: Yes No Type of	7x 79 GRAY LAWA 9x 1/5 Road So 115 BY GRAY LAWA SCHELOSE 135 KC BLACK	
	9x 1/3 And 80 ·	<del> </del>
perforator used:	115 35 CHOY LAWA SCHEARSE	- <del>Peres</del>
Size of perforations:  perforations from ft. to ft. perforations from ft. to ft. perforations from ft. to ft. perforations from ft. to ft. perforations from ft. to ft. WAS SCREEN INSTALLED? Tes No	132 VCC   BLACK /	+
Size of perforations	ILC 19H Rodush	<del>+</del>
	1/4 1/6 GRAY 1944 1'CRY GARA 1/4 194 R RYGAN "HARA	+
periorations fromit. toit.	1/6 132 18 N/2 W	+
perforations fromft. toft.	237 286 16 82	+
MAT COREM THETALLED? You	280 316 Rollish BRULA	+
Manufactures is note	W ID GRAY LAVA	+
Madel No	335 85 RADIN CLAY	+
Manufacturer's name  Type Model No.  Diam. Clot size Set from ft. to ft  Diam. Slot size Set from ft. to ft	155 BX GABY LAVA	+
Dies Sich eine Set from ft. to ft	TRY RULL LACSE	1405
	42C ME SRAY HERA	
CONSTRUCTION. Well gravel packed? Yes		100
No. size of gravel Gravel placed from ft. to ft. Surface seal provided Yes No To what depth?	440 424 8434 4 11	1450
placed fromft. toft. Surface seal	HIC WIN BLACK "	+
providei Yes Mo j To what depth?	47H WELL BALLA	<del></del>
ft. Material used is seal:	THE TSE ROCK CLAYES AND	- Me-
	THE ISSENTED LEAVES AND	<del></del> -
Did any strate contain unusable water: Yes Ro. Type of water Depth of strate ft. Method of sealing		<del> </del> -
No Type of water	.   <del>   </del>	+
Depth of strataft. Method of sealing	<del></del>	+
etrata off	. · <del></del>  - <del> -</del>	
	.  ··· <del>  </del>	<del></del>
Surface cosing used. Yes V Ho.	<del></del>	+
Gemented in place Yes No	<del></del>	<del></del> -
Locate well in section	<del>    </del>	+
1 To year	<del></del>	
	<del>  </del>	+
' i ' i	<del></del>	<del></del> -
	Work started 12 Julius 19 14	+
<u>.</u>	Work finished 17 Teles N. C.	+
<b>l</b> .	Well Driller's Statement This well we	
	drilled under my supervision and this	
	is true to the best of my knowledge.	
1	Name UEPL ( hoszer	
<b>**</b>		
•	Address Rukley In she	
;	Signed by finel thester	
` <del></del>	License No. 142 Date /4221	GL 7
LC Attrace dELL County		
	·	
VE = NE = vec. 247. 4 pm 1. 5 8/00		

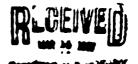
The other ride for additional remarks

- Detions,

control of the most of the most of the selection of the s

RECEIVED

Acceptly Laborat Windie Grande Mandre State



### REPORT OF WELL DRILLER State of Idaho

State law requires that this report shal Engineer within 30 days after completion or a Cam. 10 / Jennier	bandonment of the well.
WELL OWNER BOM DENTHER	Size of drilled hole: 20 Total depth of well 53 Standing water
Address Pices , Nach	Test wellvery: gpm crcfs Fump! Bail
Owner's Persit No. 6.3/392	or cfs Tump: Bail Lize of pump and motor used to make test:
NATURE OF WORK (check) Replacement well.  New well Deepened Abandoned	Length of time of test. Hrs. Min.
Water is to be used for a tragatery	Drawdown ft, Artesian pressure ft. above lar inface Sive flow cfs
METHOD OF CONSTRUCTION Rotary Cable 22	or grz. Chutoff pressure  Controlled by Valve Cap flug  No control Does well lesk around casing?  Ven  TEPTE MATERIAL WATER
CAUING OCHECULE Threaded Welded	No control Jose well less around casing
/: "Diam. from 5/3 ft. to 5/0 ft. // "Diam. from 5/3 ft. to 447 ft. // "Diam. from 5/3 ft. to 447 ft. // "Diam. from 5/4 ft. to 444 ft. // "Diam. from ft. to ft.	125 OR NO
Dian. from ft. to uuu ft.	C S feet four
Thickness of casing: 4/4 Material.  Steel concrete wood other	14 31 51 2 10 10
	72 56 70000 11
PERFORATEDO Yes No Type of	61 95 grander
Use of perforations by	15 104 11 11 1000
perforations from ft. to ft. perforations from ft. to ft.	13 13 Mich 11
rerformilons from ft. to ft.	132 137 145 11 11 11 11 11 11 11 11 11 11 11 11 11
Derforations from ft. to ft.  WALL RESM INSTALLED? Yes No  Man (a) turer's pame ( Auger Physics)	
Pice of Company Hodel No.	205 215 1000 11
Diam. 2 1 lot size Set from ft. to ft	1244 750 12 10mm 11
SCHOTAMOTION Well go el packed? Yes From No. Size of grav . Gravel	225 223 250 11 223 256 mar work a from the
place? (rom / 3 fr. to un ) ft. Surface seal provides Yes No To what depth?	124 325 11 11
ft. Material used in seal	340 341 344 11
No. ypr of water to the fit. Hethod of sealing transfer of the fit.	
strata off	Han Hold of the state of
Juriane casing used: Yes W No.	154 400 11 11 11 1 1 1 2 2 2 2 m c
erented in place? Yes No	124 124 24 24 24 24 24 24 24 24 24 24 24 24 2
Locate well in section	SIA VIV.
•	
- <u>†</u> - †	Work Statisted 2-1944
	dr ed under my supervision and this report
	Na. CALL E CILATIAT
• • • • • • • • • • • • • • • • • • • •	Attress 26 project with ser 271
	Lipnod by (( & (r - 1) - 1) - 1   Lipnod by (L. 17)   Lipnod by (L. 17)
No a sin a secold Tall Do had Ell	
1 To the state of	Additional remarks USGS

C-1-41

### WELL DRILLER'S REPORT

State law requires that this report be fitted with the Director Department of Water Administration within 30

1 WELL OWNER	7 WITER LEVEL
Name PETERMANIFRIT , TITARY, & STNS	Crutic water level 366 leet below land surface
	Frowing? Yes B No. GPM flow Temperature 69 F. Quelity (RCLLLINE)
Addres MOUNTAIN HOME, IDAH	Artesian closed in pressure
Owner-Permitto	Controlled by   Valve   Cap Plug
2. NATURE OF WORK	8 WELL TEST DATA
New well Despensed Replacement	TR Puntu / Bailer Other
	Discharge G.P.M. Draw Down Hours Furnated
: Abandoned ideacitie method of abandoning!	
3 PROPOSED USE	
र्कि Dumestic 🔧 terigation 😅 Test	9 LITHOLOGIC LOG
🗇 Municipal 🕒 Industrial 🗇 Stock	Freitre Dapen Westernel Von Me. No. No.
4. METHOD DRILLED	5° 16 <b>в</b> .н.
43 Cotto (3 Bosses (3 B o ) 5 Otto	10 4 SOL AND SURSDIC
&R Cable (3 Rotory (3 Due (5 Other	L 14 MARLPAN AND B-SALT B-JLDIPS F
& WELL CONSTRUCTION	62 170 BROWN BURNY CLAY
Diameter of hole 6 inches Total depth 101_ feet	7 72 CINGIRS B
Casing schedule (2 Steel 🗇 Concrete	102 11
Thushous Dismose From To  2,280 inches 6.5/8 inches 1.1 feet 15 feet	120 GREY, RED. BROWN PINHOLF X
unches feet feet	132 137 BROWN PURNT (CLAY)
inchesfeet feet feet feet	13) 17 GREY PINMOLE BASALT R
inches feet feet	177 162 FRACTURE
	16- 19 GREY BASALT HARDER W DEPTH X
Was a pecker or seel used? ☐ Yes 12 No Perforested? ☐ Yes 12 No	207 21 CHEY-BROWN, MEDIUM HARD X
How perforated?   Factory   Knife   Torch	213 229 RED BASALT, MEDILY HARD X
Size of perforation Inches by inches	1262 202 BROWN BASALT, MEDIUM HARD I IN I
Number From To Just	202 260 SOULDERS, PROM. BURNT CLAY A
perforations feet feet	262 27 GREY BASALT MEDIUM HARD X
perforations feet teet	281 333 GREY BASALT, SOFT PINHOLE
Well acreen installed? ☐ Yes 图 No	INGREASINGLY HARD BYDGST4
Manufacturer's name	LREVICE, CINDERS 200-200
Type Model No.  Durneter Slor size Set from feet to feet	131 352 RED BASALT (CREVICE CINCERS
Diameter Slot eze Set from feet to feet	PINHOLE, RUSSLE, 333-339) H
Gravel package?   Yes MR No Size of gravel	358 360 CREVICE CINDERS. MATER R
Placed from feet to (ve)	360 LOT BLACK FINE LE BASALT R
6 di	
Surface seet?   Yes   No To what depth: 15 feet Meterial yeard in seel   Coment grout   Puddling clay	
& LOCATION OF WELL	1
Statch map location must agree with written location.	Work started FEB 13, 1071 Innehed MARCH 11, 1174
[- <del></del>	WORK \$18/100
<u> </u>	11. DRILLER'S CERTIFICATION
*	This well was drilled under my supervision and this report is
\\.\.\.\.\	true to the best of my knowledge
· Lil	•
•	MOUNTAIN HOUR MELL DRILL'AS
County . File RI	PC B x U.S. Umprays have great
	Address Was and Man A Man
NO A SO A SAC 25 T LS #5 R E E	Bigned Bi
- CONTRACTOR OF	, Date

|: '

5 . 3 · · MEPORT OF WELL DRILLER State of Idaho Department of Lumation State law requires that this report shall be filed with the State Beclametics Engineer within 30 days after completion or abandonment of the well. Sise of drilled hole: Total
depth of well: 4-5 Standing water
level below ground: Temp.
Pahr. Test delivery: gp
or efe Pump? Bail
Sise of pump and motor used to make test: Orner's Permit No. MATURE OF WORK (check): Replacement well
New well A Deepened Abandoned lire. Drawlows: ft. Artesian pressure: ft. abov. and surface Give flow cfs or gpm. Shutoff pressure: Controlled by: Valve Gap Plug No control Does well leak around casing? Longth of tipe of test: Water is to be used for: Irr, 94 1,000 METHOD OF CONSTRUCTION: Botary [ Cable [ Dug Other (explain) CASING SCHEDULE: Threaded NG SCHEDULE: Threaded Welder
"Diam. from ft. to
"Diam. from ft. to
"Diam. from ft. to Welded DEPTH MATERIAL FROM TO YES OR NO FEET FEET "Diam. from\_ \_\_\_ft. to \_ Thickness of casing: Material: 250 31 Black lava Steel concrete wood other 60 100 Grey lava 100 120 Grey, black lava 120 140 Gray lava (explain)
(ED? Yes No Z Type of 140 185 Hard black lava PERFORATED? 185 197 Red lava perforator used: 197 210 Brown lava 210 232 Black lava Size of perforations: 232 Open ground Cu rings It. to perforations from 240 252 \_ft. perforations from \_ft. to 252 256 Red clay, cinders perforations from \_\_ ft. 256 260 Brown lava perforations from WAS SCREEN INSTALLED? Yes 260 270 Black lava 270 275 Red lava & cinders Manufacturer's name 275 278 Brown lava Model No. Type\_ Red clav & cinders 278 284 Diam. Slot size Set from ft. to Diam. Slot size Set from ft. to 284 288 Grev lava 288 Black sandy lava 325 Red & brown lava 300 CONSTRUCTION: Well gravel packed? Yes 325 360 Brown lava No. size of gravel Gravel
placed from ft. to ft. Surface seal
provided? Yes No To what depth?
ft. Material used in seal: 360 364 Brown clay & cinders 364 370 Brown lava; loose 370 397.5 Black porous lava 397.5 405 Red cinders lost 99% cuttings Black sandy porous lava Did any strata contain unusable water? Yes No. \_\_\_\_\_ ype of water \_\_\_\_\_\_\_ ft. Hethod of seal 405 410 50% cuttings lost Black porous sandy lava 410 ft. Method of sealin Come cuttings lost strata off: 423 425 Hard grey lava 425 450 Black porous sandy lava Surface casing used? Yes - Comented in place? Yes 450 485 Black porous lava 485 525 Brown sandy clay Locate well in section Work finished 6-7 706 Well Driller's Statement - Seci drilled under my supervision and this report is true to the best of my knowledge. Name:\_ Address: Signed by LOCATION OF WELL County County USGS Use ober side for additional remarks

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# REPORT OF WELL OF LUTE State of 124%

	ELL OF LLER  1 144.0  1 be filed with the State Reffigurator	na.
REPORT OF W	ELL OF LERR	7 W J.
State law requires that this report shal Engineer within 30 days after completion or a		1909 17/an
WELL OWNER:	Hench of well: 600 Steading water	
Address Coldwell. I duho	level below ground: 359 Tesp. Fahr. Test delivery: 2000	_
	orcfs Pump? Sail	<b>,,</b> ~
Owner's Permit Ho.  NATURE OF WORK (check): Replacement well	Size of pump and motor used to make tee	
New well 🔯 Despensed 📋 Abandoned 📋	Length of fine of test: Nrs. N Drawdown: ft. Arteeian pressure: f	18.
Vater is to be used for: Transfell	iabove land surface Give flow of	•
NETHOD OF CONSTRUCTION: Retary Cable Dug Other	or gpm. Shutoff pressure: Controlled by: Valve Cap Plug No control Does well leak around ca	
(explain)  CASING SCREDULE: Threaded   Welded   X	Ass Des Ast leaf stands ca	wrag.
AC "Diag. from O ft. to IC It.	DEPTH MATERIAL V	ATER
"Diam. from ft. to ft. "Diam. from ft. to ft.	FROM TO TES	OR BO
"Diam. fromft. toft.	0 7 Surface	
Thickness of casing: 750 Material:	7 37 Buch Lave	
Steel X concrete  wood  other	35 50 Reduch Brims Lara	
	66 St. Orch Gray Land	
(explain) PERFORATED? Yes No No Type of	40 83 Bound Land	
perforator used:	42 125 Barres Land	
Size of perforations: " by "	123 167 Gray 6000 163 186 Act 600	<del></del>
perforations from ft. to ft.	156 179 Bine Lave	
perforations fromft. toft. perforations fromft. toft.	275 275 Pork Grey Know	
	COLORD Brown band	
WAS SCREEN INSTALLED? Yes NO	262 DX Gren Lava	
Hanufacturer's name Type Hodel No.	270 271 Red Kuna 271 271 Novish Bourn house	<del></del>
Diam. Slot size Set From It. to It.	1285 13/5 1 (- cen hara - 1	
Diam. Slot size Set from ft. to ft.	1) 122 Arch Granthus ham tron	
CONSTRUCTION: Well gravel packed? Yes []	445 1947 Bluck Sunda Clau	
No. size of gravel Gravel placed from ft. to ft. Surface seal	447 427 Black Sundy Lux, Black Cla.	ر حمرت
provided? Yes No To what depth?	425 760 Bourn Sundy Clay	524.35
ft. Material used in seal:	and Some Course Course	7
Did any strata contain unusable water? Yes	<del>                                     </del>	
No. Type of water: Depth of strata ft. Method of seeling		
strate off:	<del></del>	
Surface casing used? Yes No.		
Cemented in place? Yes No		
Locate well in section		
<del></del>   <del></del>	Work finished:	
	Well Driller's Statement: This well was	
50c p	drilled under my supervision and this r is true to the best of my knowledge.	4 PO F 1
	Nase: (5 : 1) to the seat of my modified.	
p	Address: JE S'LON Man Hame I d.	<u>.</u>
	Signed by George Stacker	
L	License No/ Date	
LOCATION OF WELL: County KANI 1 L	7	
11 N 11 N Sec. 24 7. 4 8/8 R. 5 E/V		

USGS

EXPORT OF WELL DRILLER State of Idaho

Department of Maclemetics the State Reclamation

magageer attain to make enter combination on a			
WELL OWNER:	Size	of dri	illed hole: 2c 4/4 Total bil: 437 Standing water
Mass M. W. Fisher	depth	of we	11: 4.17 Standing water
	level	below	ground: 216 Temp.
Address of rest Falls Montene	Fahr.	10	round: 274 Temp. Test delivery: 2475 pm
	01		:fs Pump? Bail
Owner's Persit No. 6- 33 240	Size	o? pu	rs Pump? Bail up and motor used to rake test:
MATURE OF WORK (check): Replacement well		10"	Aumo Hoc HP coco & frage
New well Despend Abandoned	Langt	n of t	time of test: U Hrs. Min.
Vater is to be used for:	Drawd	OAU:	ft. Artesian pressure: ft.
	PPOAG	lend	surface Give flow cfs
METHOD OF CONSTRUCTION: Rotary 🔼 Cable 💽	10r	gpm.	Shytoff pressure:
Dug Other	Contr	olied	by: Valve Cap Plug Does well leas around casing? No MATERIAL WATER
CASING SCHEDULE Threaded Welded	NO CO	BEFOI	To boss Astr leak stoned casist.
CASING SCHEDULE. Threaded Welded	1148	274	MAREDIA!
76 Mar. 1708 47 10. 10 2/39 10.	FROM	70	YES OR NO
"Dies (ros	FELT		
/6 "Diaz. from 4 / ft. to/34 ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft.  "Diam. from ft. to ft.			
Thickness of casing: Material:	0		top dirt .
	15 47	47 100	grey lava "broken"
Steel _ concrete _ wood _ other _	100	118	grey lava
	118	131	grey lava "loose"
(explain)	131	191	brown lava .
PERFORATED? Yes No Type of	191	195	cinders .
perforator used:	195	213	red lava
	213 -	215	cinders
Size of perforations: " by "	215	330	red lava
perforations from ft. to ft.	230	238	grey lava "hard"
	238	243	grey lava "loose"
perforations fromft. toft.	243	250	brown lava
VAS LAGEN INSTALLED? Yes No	250	257	loose rock, lost cuttings
	257	292	alternate layers of loose &
Manuferturer's name Model No.			solid grey lava about 3 loose
Type Model No.  Diam. Glot size Set from ft. to ft Diam. Slot size Set from ft. to ft	4 202	201	& 3 solid
Diam. Slot aise Set from ft. to ft.	1 201	301 313	brown clay grey lava "hard"
	313	323	loose rock and clay
CONSTRUCTION: Well gravel packed? Yes	323	374	grey lava
n'esed (ros ft to ft Surface ces)	373	381	red lava "broken"
No size of gravel Gravel placed from ft. to ft. Surface seel provide: Yes Mo To w t depth?	381	341	red lava "hard"
provide: Yes Mo To w t depth?ft. Material used in seal:	391	395	red cinders
	395	397	red lava "hard"
Jid any strata contain unusable water? Yes	397	408	
NoType of water: Depth of atrataft. Hethod of mealin	408	412	
Depth of strataft. Method of sealing	412	415	_
strata off:	745	435	· ·
	435	437	grey sand
		<del></del>  -	
Surface casing used? Yes No.			
Cemented in place? Yes No			
Locate well in section			
, ,			
* · * * · * · ·	MOLK	miart(	d
	WOTE	111111	march 11 1967
20	42.1	ad use	er's Statement. This well was der my supervision and this report.
	1		
	Name		the best of m, knowledge.
		<del></del> ;	<del></del>
•	A11re	* <del>-</del>	the state of the s
	Jigna	1 by .	Le Employer
↓	•	se No	20 3 Sate 0 4 1 1 176 7
of the dr. County to the Land			
NE /4 NE /4 10: 30 To 4 10 10 10 5 2/1	1		Hece
10 - 11 11 - 17 1 - 18	- 4 4 . 4	1	USGS

### STATE OF IDAHO DEPARTMENT OF WATER RESOURCES

SALLPOINT PEN No. 31

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## WELL DRILLER'S REPORT

State tax regulars that this report to filled with the Director, Department of Water Resources within 50 days ofter the completion or alcondomness of the well.

2 Well comes 46 Burne Godly	7. WATE			
Holstein Heifers Los Angeles (A	,		•	
my Holoding Hailan 675 Canting	100		382 100 0000 10	
THE PROPERTY OF THE PROPERTY OF	Static t	1000		
And Claustale C. 186 . Will	Plawin	e, mi≜e	N @ No G.P M. No	
Actor Glandale, Culiberain ""	<b>~1098</b>	n closed in	pressure	
<i>(</i> ), , , , , , , , , , , , , , , , , , ,			LI Valve Ci Cup (	.) Plug
Omer's Pornix No. Kellecement -	Tompe	due 7	y of. Quelley	
			<del></del>	
2. MATURE OF WORK	& WELL	TEST DAT	TA .	
(Filess well Despured III Repleasment	i Si Pur	ng [ji	Baller 🛘 Agr 🗇	Other
Abandanal Idearthe method of shandoning				
	Dispharan	G.P.M	Pumping Lords	Heart Parrient
			_	į.
	1			1
	1			Ì
1. PROPOSED USE	L .			I
☐ Demestic & Irrigation ☐ Yest ☐ Municipal	9. LITHO	rodic re	75	
☐ Industrial ☐ Stack ☐ Waste Organial or Injection	Hete Dep	h		T Water
Other (questify type)	Olam From		Motorial	Yell
	20 0		*******	1 1
4 METHOD ORILLED		3	topsoil	+-+:
	. 3	154	clinkers, boulde	₮₱ <del>੶</del> ϯ╼╌┼ <sup>╸</sup>
E Retery - Air - Hydraulic - Reverse rotary	151		leve	╅╌╅╸
G/Cable   Dug   Other	_ 210	240	lava & cinders	+++
	240	410	leve rock	<del></del>
E. WE! COMETRUCTION	410	425	brown clay, grav-	
	425	445	very sandy brown	
Casing exhaulte: Ef Steel     Concrete     Other	445	490	clay	10
	490	645	brown sandy cong	lomerate
Teldiness Digmess Prom To	ļ			L_L_
	$\mathbf{I} = \mathbf{I} \cdot \mathbf{I}$	I I		
Inches Inches feet feet		- T		
inches inches from		7		
Inches Inches feet feet		-		
Was coming drive phase used? □ Yes <b>U</b> /No				
Was a passhar or east used? 🔘 Yas 📑 No	t t t	_		
Perforated?   ☐ Yes ☐ No	<b>├</b> <del> </del>			<del></del>
How perforated?     Factory     Kello       Torch	[	<del></del>		<del></del>
Size of perforation instead by instead	F	<del></del> +- ·		<del></del>
Number From To	<del>}</del> ~ ⊶∮ •	- <del></del>	<del></del>	<del></del>
perforations feet feet				
	<b>├</b> ~~- <del> </del>			1 1
perforations (aut faut				
perforations feet feet				
perforations feet feet				
perforationsfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeetfeet				
parlorationsfeetfeetfeetfeetfeetfeetfeet				
perforations feet feet perforations feet feet Wall screen installed? Uses BY No Manufacturer's name Type Madel No.				
perforations feet feet perforations feet feet Well screen installed? Uses BY No Manufacturer's name Type Madel No. Digmeter Set day Set from feet to feet			D.E.	
				4
perforations feet feet  perforations feet feet  Wall screen installed? Use SF No  Manufacturer's name  Type			D:=-	
				<b>A</b>
perforations   feet   feet				
perforations feet feet perforation perforations feet feet perforation feet feet feet feet feet feet feet fee				
perforations   feet   feet			0	
perforations feet feet perforation perforations feet feet perforation feet feet feet feet feet feet feet fee			0	
perforations   feet   feet			OC.	
perforations   feet   feet			——————————————————————————————————————	
perforations   feet   feet			0 - 15-79 Nation	
perforations   feet   feet		t turned	——————————————————————————————————————	
perforations   feet   feet	10.		——————————————————————————————————————	
perforations   feet   feet	10. West	IRS CER	6-15-79 Nation	
perforations   feet   feet	10. West	.ERS CER	6-15-79 Makker TI-FICATION	<i>U-1-72</i>
perforations   feet   feet	10. West	SRECER	4-15-79 Nebboo TIFICATION I of minimum well coor-	<i>U-1-72</i>
perforations   feet   feet	10. World I/No a compli	ARE CER	6-15-79 Nations TIFICATION I off minimum well coor. the time the rig was rea. tay Original	<u>u-7-79</u>
perforations   feet   feet	10. West	ARE CER	6-15-79 Nations TIFICATION I off minimum well coor. the time the rig was rea. tay Original	<i>U-1-72</i>
perforations   feet   feet	10. World I/No a compli	and can orthy shat Sai 2 f	6-15-79 Nations TIFICATION I off minimum well coor. the time the rig was rea. tay Original	<u>u-7-79</u>
perforations   feet   feet	10. World I/No a compli	Sins centre sheet of the state	6-15-79 Nations TIFICATION I off minimum well com- toy Drilling Lang Co.	<u>u-7-79</u>
perforations   feet   feet	10. World I/No a compli	Sins centre sheet of the state	### Minimum well over the time the rig was ren. top Orelling lang Co	<u>u-7-79</u>
perforations   feet   feet	11. DRILL I/No e complii Pirm No	Ens centre state of the centre	## House  ### House  ###################################	<u>u-7-79</u>
perforations   feet   feet	11. DRILL I/No e complii Pirm No	Sins centre sheet of the state	## House  ### House  ###################################	<u>u-7-79</u>
gerierations   feet   feet	11. DRILL I/No e complii Pirm No	Ens centre state of the centre	## House  ### House  ###################################	<u>u-7-79</u>
perforations   feet   feet	11. DRILL I/No e complii Pirm No	Ens centre state of the centre	## House  ### House  ###################################	<u>u-7-79</u>
Best   Sect   Sect	11. DRILL I/No e complii Pirm No	Ens centre state of the centre	## House  ### House  ###################################	<u>u-7-79</u>
gerierations   feet   feet    Wall screen installed?   Ves   Who    Majuricaturer's name    Type   Madel No.    Diameter   Stot size   Set from   feet to   feet    Diameter   Stot size   Set from   feet to   feet    Grand pashed?   Ves   Me   Size of grand   feet    Flexed from   feet to   feet    Burlane sed depth   E   Metarial steet in east   Carnet grant    Pased from   Set yet   Tomp seriese easing    Describe assess part   Threated   Webled   Selvent    Weld    Carnette assess part    Buttled   Selvent    Buttled   Selvent    Weld    Carnette assess part    Buttled   Selvent    Weld    Carnette assess part    Buttled   Selvent    Weld    Carnette assess part    Buttled   Selvent    Weld    Carnette assess    Buttled   Selvent    Weld    Carnette assess    Buttled   Selvent    Weld    Carnette assess    Buttled   Selvent    Weld    Buttled   Selvent    Weld    Carnette assess    Buttled   Selvent    Buttled   Selve	11. DRILL I/No e complii Pirm No	Ens centre state of the centre	## House  ### House  ###################################	<u>u-7-79</u>

でいると言うからなる。同じなどのない。

### REPORT OF WELL DELLERS

N. N.

State law recuires that this manner shall Englacer within 30 days after completions of a	MARGORNERY OF THE WOLL.	i
Francis Brooks	Sine of crilled hele: 20 Total 4: depth of well: 410 Standing water level below ground: 315 Temp.	1
Eddines Hay 484	Fair. Pest delivery: por cfs Pump? Bail	<b>)</b>
Caldwell Idelor	or cfs Pump? Bail Size of pump and soter used to make test.	:
MATTAL OF LOTE (chack): Replacement well	length of time of test:krs. /4s	
<del>-</del>	Day days days day days and a same of the s	
ETHOD OF CONSTRUCTION: Rotary _ Cable Z	or cpm. Shutoff ressure:	
Vater is to be used for:  **EDITION OF CONSTRUCTION: Rotary	No control Doen well leak around east	Is:
SASING DOUBLING Threaded Welded To.	DEFIA MATERIAL VA	TIR
"Dille frazille to to to	FROM TO THE	
#22123 Pros	0 30 tan soil	
Steel X concrute vood other	30 160 grey lava 160 280 red Lava	<del>_</del>
	280 314 hard grey lava	<del></del> ¥
PERCORNION IN THE Type of performance as a	360   395   hard gray lava	<del>as</del>
perforation ask	1409 416 sand brown	14
per proteon from the to		
markers from the first fire		
perferations fromft. toft.  perferations fromft. toft.  AS FOREST MACHINES Yes No		
. arginetari, a mile		
Type Mouel No.  Dies. Slot size Set from ft. 10 it  Dies. Slot size Set from ft. 10 ft		
Sies. Slot size Sot from ft. to ft		<del></del>
CONSTRUCTION: Well gravel packed? Yes Disable of gravel		
No. Sine of gravel Gravel placed from ft. to ft. Surface soel provided? Yes No. To what depth?		
ft. Enterial used in seal:		<del></del>
Did er? strote contain unusable water? Yes		
No. R Type of tuter: Sopth of strata ft. Hethod of scaling		
ctPata off:		
Curtan made you		
Curface cucia, used? Yes No. No. No.		
Locate well in section		<del></del> - 2
and the second property and the second	started: Max 15 1964	
ملاق مم	Work finished: That 1964 !	<del></del> :
	irilled under my supervicion and this re- is true to the best of my knowled in-	.07:
·	Tage: // 1.0/	<del></del>
	Interest Figure 116 9 Carlos et	
12/11	License Ko. 186 Date: Nov. 1/96	<b>Z</b>
300 36 T. 40 5 55 Ell	.5	
the utter side for	edditional remarks	
	No.	
		fet ev
1989 p	A series of the	, <b></b>
•		
1		
L	het Copy - no che	een
	/ /	2 /

[A-60]

WELL DRILLER'S REPORT
requires that this report be filed with the Diriertor Department of Within Rissianes

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1 WELL OWNER	7 WATER LEVEL
10- Den Brepst	State was the a 320 to the transfer the Reputites
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# STATE OF IDAHO DEPARTMENT OF WATER RESIDENCES

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### WELL DPILLER'S REPORT

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# STATE OF IDAHO DEPARTMENT OF WATER RESOURCES

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## WELL DRILLER'S REPORT

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### WELL DRILLER'S REPORT

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LABORATORY AND FIELD QUALITY CONTROL PROGRAMS

### APPENDIX B

### LABORATORY QUALITY CONTROL PROGRAM

UBTL is an accredited laboratory of the American Industrial Hygiene (AIHA) Association (No. 17) and, as such, participates in an extensive interlaboratory proficiency analytical testing program sponsored by the National Institute for Occupational Safety and Health (NIOSH). In addition, UBTL is currently licensed by the Center for Disease Control (CDC) to perform chemical and clinical analyses of biological specimens and is State of Utah/USEPA approved for environmental analyses. The comprehensive internal quality control program at UBTL is detailed as follows.

### INTRODUCTION

UBTL has implemented an effective system for Quality Control (QC) for samples analyzed from Mountain Home AFB. Procedures that are employed include:

- 1. Services of a full-time Quality Control/Quality Assurance Section.
- 2. Preparation of internal quality control samples.
- 3. Collection and evaluation of quality control data.
- 4. Generation of quality control charts.
- 5. Instrument calibration and maintenance.

### SAMPLE ANALYSES

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At least one blank sample and one reagent blank are included with each set of analyses and processed through the complete analytical procedure in order to detect any contamination in either collection media or reagents. In addition, duplicate analyses are accomplished on a minimum of 10 percent of all samples submitted from Internal quality control samples, generated in the laboratory and containing known quantities of specified analyte(s), are run at the rate of 10 percent of the total field sample workload. At the completion of the analysis of a sample set, each chemist calculates his results and reports the results on the Analytical Report Form. Results for replicated samples and internal quality control samples are reported on the computer-generated Quality Control Data Sheet. Before the results are submitted to the Group Leader, another peer chemist analyst is assigned to check results for possible errors in the calculations. He must approve results reported on both the quality control sheet and the sample sheet. The Group Leader, after his evaluation of the data, gives the report sheets to the Quality Assurance Specialist (QAS) for his evaluation and implementation of any required action.

Specific steps are followed when any one QC sample result is determined to be out of control in connection with the analysis of a field sample set. QC charts with adjusted control limits of  $\pm$  3 standard deviations will generally be used to determine whether a result is out of control. If QC results are in control, the QAS signs off the report. It is then reviewed by the Section Head for accuracy of the results. Upon final approval of the reports by the QAS and the Section Head, the reports are sent to the sponsor.

The paperwork containing the raw data for a sample set (i.e., chart paper, computer readouts, paper tapes, calibration curves, tables of data, etc.) is collected and placed in an  $8\frac{1}{2}$ -inch by 11-inch envelope that has been labeled with sample numbers, analyst, date, and other pertinent information. The envelopes are filed by laboratory number for possible future reference and data retrieval. Raw data for each sample analysis are therefore readily available, if needed.

### QUALITY CONTROL SAMPLE DATA ANALYSIS

A record of the preparation of internal QC samples is detailed in the QC log book maintained by the QAS. As appropriate, a set of QC samples is distributed to the chemist along with each sample set at an average rate of at least 10 percent of the submitted samples. The analyses and data evaluations are performed for these QC samples, along with the submitted samples, and results are tabulated on the computer-generated Quality Control Data Sheet. At least duplicate results are reported for each internal QC sample.

QC charts are generated for each analyte through the analysis of QC sample results. Each result is divided by the theoretical value to standardize results so that data from all concentrations can be directly compared for accuracy and precision. When a control data set of N sample results has been accumulated, the following statistics are calculated: mean percent recovery, replicate standard deviation, and set standard deviation. These statistics are then used to determine accuracy and precision QC limits.

The control data set is updated after evaluation of 20 successive QC samples and includes data on the 50 most recent results. Any control sample analysis that is beyond accuracy or precision limits is not used in the subsequent determination of new limits.

### EXTERNAL QUALITY CONTROL PROGRAMS

In addition to internally generated QC data, other information concerning QC is provided by the participation of UBTL in four interlaboratory QC programs: NIOSH Proficiency Analytical Testing (PAT) Program; two CDC Blood Lead QC Programs; and State of Utah Environmental Quality Control Program. The PAT Program and the CDC Blood Lead Programs involve the participation of more than 100 laboratories on a nationwide basis. The PAT Program addresses the analysis of filter samples for lead, cadmium, zinc, free silica, and asbestos and the analysis of charcoal tubes for various organic solvents.

### LABORATORY DATA REDUCTION

A significant fraction of the Chemistry Department's work involves data Mathematical models, based upon analysis of standard solutions or processing. samples, are generated in order to determine the quantity of analyte present in the Considerable time and effort are saved by the utilization of automated data processing procedures. Data processing by the computer can include, for example, calculations, generation of standard calibration curves, mathematical modeling of standard curves, statistical analyses, and the generation of hard copy Advantages intrinsic to the use of an automated system include more accurate calculations, immediate and accurate generation of data plots, fewer transcription errors, and no calculation errors after programs have been verified and In general, the types of data that are processed are those derived from the following techniques: atomic absorption and flame emission spectroscopy, gas and liquid chromatography, optical absorbance spectrophotometry, specific ion electrode, fluorescence spectroscopy, and wet chemistry determinations. functions are employed for QC data. In addition, the data system is utilized to store QC data, provide statistical analyses, and generate and update QC charts. The advantage of the provision for statistical analyses and the production of QC charts by automation is that the charts may be easily updated with minimal effort. QC data and any required action may, therefore, be provided on a daily basis.

### REPORTING PROCEDURES

The analytical data are reported to the sponsor at the completion of each sample set. The report includes the following items:

1. A memorandum describing the sample set; the condition and appearance (i.e., homogeneity, integrity, etc.) of the samples upon receipt at UBTL; the method, equipment, and technique used in the determination; any interferences that were observed; and any unusual circumstances that may

have occurred during the analysis. [The limit(s) of detection are also reported.]

- 2. UBTL Analytical Report Form, including field ID number, laboratory ID number, identification of the analytes, results of each determination, limit(s) of detection, and comments.
- 3. Other items, such as copies of strip chart recorder output, computer printout sheets, and other raw data (to be included as required).

### INSTRUMENTATION

Each major equipment item at the UBTL Chemistry Department undergoes a routine preventive maintenance check on a regular schedule. This check is accomplished by a trained engineer. In addition, performance checks are made by the analyst prior to the analysis of each set of samples. This involves the analysis of one or more standards and a comparison of the values obtained with previous results and conditions. This information is recorded in an instrumentation log.

When an instrument or apparatus malfunctions and the problem is not readily corrected, the appropriate Section Head is notified. If it is determined that a visit by the service representative is required, a service call is scheduled and the QAS is Action by the service representative is recorded by the QAS in the notified. Instrument Maintenance Log, and the appropriate customer field and service order forms are filed, by instrument, in the Instrument Maintenance Log Supplement File. In an effort to monitor and maintain instrument specifications, logs for each of the AA spectrophotometers, the gas chromatographs (GC), the X-ray defractometer (X-ray), and the mass spectrometers (MS) have been provided for the analytical chemists' use each time an analysis is performed. The AA instrumentation logs contain entries for date, analyst, lamp number (if more than one lamp is available), standard concentration (recommended in manual), reading in milliabsorbence units, and a column for when instrumental parameters differ from the recommended conditions listed in the manual. The GC, X-ray, and MS logs contain entries for date, time, analyst, set identification number, and comments on parameters or performance.

A comprehensive analytical chemistry equipment list is included at the end of this document.

### TRAINING

UBTL has established a continuing program of training of current personnel with respect to QC procedures. In addition, an intensive program for the training of recently recruited personnel in both analytical methods and techniques and QC policies has been implemented. It is the responsibility of the QAS and the Laboratory Director to train all laboratory personnel.

### RESULTS OF THE LABORATORY QC PROGRAM

The results of the QC analyses for ground water, surface water, and soil samples are presented in Tables B-1 and B-2.

### Ground Water and Surface Water QC Analyses

The laboratory QC program for ground water and surface water included analyses of spiked and duplicate samples and a method blank for each constituent. The samples used for QC analyses included the east and west lagoon, MH-1, NW-2 samples, and distilled water. In general, the spiked recoveries were satisfactory, ranging from 85 to 110 percent, except for the lagoon samples. Spiked recoveries in the lagoon samples ranged as low as 28 percent because of interference with bacteria in the water. When distilled water was substituted for the lagoon samples, the recoveries were satisfactory. The additional analysis of the spiked distilled water samples by the laboratory demonstrated that the method specified (EPA 608) was not effective in quantifying the pesticides in the lagoon water. Analyses of duplicate samples were also satisfactory. Traces of lead and cadmium were detected in the method blanks while analyzing the west lagoon and W-2 samples. The lead, chromium, and cadmium results for those two samples have been corrected for the concentrations found in the blanks.

### Soil QC Analyses

The laboratory QC program for soil samples included one or two spiked and duplicate samples and a method blank for each constituent. With the exception of the oil and grease and the pesticides, the spiked recoveries were between 87 and 110 percent. The oil and grease recovery of 125 percent was slightly higher than the accepted range. The pesticides showed recoveries of less than 10 percent when the spiked samples were analyzed using the specified method. Table B-2 shows that the laboratory analyzed additional spike samples using a sample leachate in order to show that the methodology was satisfactory. The additional testing showed recoveries in the range of 87 to 98 percent with the exception of p,p'-DDT, which was 146 percent. All of the duplicate analyses showed satisfactory reproducibility except lindane, in which there is a ten-fold difference between the duplicate

samples. None of the method blanks contained detectable concentrations of any of the constituents.

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TABLE B-1

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UBTL QUALITY CONTROL REPORT Mountain Home AFB - Water Analyses

Parameter	Method	Unite	Detection 8 Limit	Spiked Sample	Initial Value	Spike Conc.	Percent Recovered	Split Sample	First Value	Second Value	Method Blank
TOX TOC 011 & Grease	9020 ( 415.1 ( 413.2 (	(1) ug/L (2) mg/L (2) mg/L	10. 1. 0.4	E. Lagoon MH-1 (4)	1830 3.56	1850 1.96	48.7 102.5	E. Lagoon E. Lagoon (4)	1950 50.4	1870 55.8	* * *
Phenol	420.2 (2)	2) mg/L	0.01	W-2	*	0.500	92	W-2	*	*	*
Lead	239.2 (	(2) mg/L	0.01	W-2	* *	0.0952	88	W-2	* *	* *	0.02 (5)
Chromium	218.2 (	2) mg/L		W-2	*	0.00952	85		*	*	*
Calmtum	213.1 (			W-2	*	0.0952	109	W. Lagoon	*	0.01	0.07 (5)
Silver	272.1 (	2) mg/L	0.01	W-2	*	0.0952	91	W-2	*	*	*
Aldrin	) 809	(3) µg/L	0.005	W. Lagoon	*	5.0	20	W-2	*	*	*
				E. Lagoon	*	5.0	22				
				Dist. H,0	*	5.0	103				
p,p'-DDT				1				W-2	*	*	*
o,p-DDT								W-2	*	*	*
aga								W-2	*	*	*
DDE	) 809	(3) µg/L	0.01	W. Lagoon	*	5.0	16	W-2	*	*	*
				E. Lagoon	*	5.0	18				
				Dist. H,0	*	5.0	96				
Dieldrin	909	(3) µg/L	0.005	W. Lagoon	*	5.0	36	W-2	*	*	*
				E. Lagoon	*	5.0	34				
				Dist. H,0	*	5.0	106				
Endrin	) 809	$(3)$ $\mu g/L$	0.005	W. Lagoon	*	5.0	40	W-2	*	*	*
				E. Lagoon	*	5.0	38				
[B-				Dist. $H_2^0$	*	5.0	101				
-7]											

Mountain Home AFB - Water Analyses UBTL QUALITY CONTROL REPORT TABLE B-1 (Continued)

recorded ecococcy propagators recorded a variables.

Parameter	Method	70	Units	Detection Limit	Spiked Sample	Initial Value	Spike Conc.	Percent Recovered	Split Sæmple	First Value	Second Value	Method Blank
Heptachlor	809	1/8n (3) ng/L	1/Bn	0.005	W. Lagoon E. Lagoon Dist. H <sub>2</sub> 0	* 0.007 *	5.0 5.0 5.0	29 28 105	H-2	*	*	*
Heptachlor Epoxide Lindane	608 608	(3)	1/Bn 1/Bn	0.005	W. Lagoon E. Lagoon	* * *	5.0	81 90	W-2 W-2	* *	* *	* *
Methoxychlor Chlordane Toxaphene alpha-BHC beta-BHC	608 608 608 608 608 608	232333	7/8n 7/8n 7/8n 7/8n 7/8n	0.1 0.2 1. 0.005 0.01	2				K - 2 K - 2 K - 2 K - 2	****	****	****
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Test Methods for Evaluating Solid Waste, SW-846, 2nd Ed., 7-82, Modified for use on an O.I. Corp. Model 610 TOX Analyzer. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised 3-83.

Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, 7-82.

QC combined with water extracts of soil samples.

Results have been blank corrected.

Signifies "below detection limit." E8888.

TABLE B-2
UBTL QUALITY CONTROL REPORT
Mountain Home AFB - Soil Analyses (1)

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Parameter	Method	Units	Detection Limit	Sp1ked Sample	Initial Value	Spike Conc.	Percent Recovered	Split Sample	First Value	Second Value	Method Blank
Moisture	Grav.	**	1					DM-1 Bore 1	14.2	13.5	
								DM-4 Bore 1 4:1	8.39	7.42	
								DM-9 Bore 2 9:2	10.6	9.91	
TOX	9020 (2)	8/811	2	$ \begin{array}{c} DM-1\\Bore & 1\\1:1 \end{array} $	310	20	96	DM-1 Bore 1 1:1	317	303	*
[B <b>-9</b> ]				$ \begin{array}{c} DM-4\\ Bore 1\\ 4:1 \end{array} $	670	30	103	DM-4 Bore 1 4:1	641	622	
Т0С	415.1 (3) mg/g	mg/g	0.01	$\begin{bmatrix} DM-2 \\ Bore & 3 \\ 2:3 \end{bmatrix}$	0.72		16	DM-4 Bore 1 4:1	11.8	8.6	*
				DM-3 Bore 4 3:4	9.65		104				

TABLE B-2 (Continued-2)

### UBTL QUALITY CONTROL REPORT Mountain Home AFB - Soil Analyses

Parameter	Method	Unite	Detection Limit	Spiked Sample	Initial Value	Sp1ke Conc.	Percent Recovered	Split Sample	Pirst Value	Second Value	Met hod Blank
Oil & Grease	413.2 (3) mg/g	8/8m	90°0	DM-2 Bore 7	*	1.5	125	DM-4 Bore 1	29.2	29.5	*
				DM-3 Bore 2 3:2	*	1.5	110				
Phenol	420.2 (3)	8/8n	'n	DM-4 Bore 1 4:1	*		001	DM-4 Bore 1 4:1	*	*	*
Lead	239.1 (3)	8/8n	10	DM-4 Bore 1 4:1	33		105	DM-4 Bore 1 4:1	27.4	39.1	*
Aldrín (B-1	(4) 809	ng/L	0.01	DM-9 Bore 2 9:2 ∫	*	10	< 10	$ \begin{array}{c} DM-9\\Bore 2\\9:2 \end{array} $	*	4	*
10]		·		Leach DM-9 Bore 2 9:2	<b>*</b>	20	88				
TOO-'q,q	(4)	1/Bn	0.05	$ \begin{array}{c} DM-9\\Bore 2\\9:2 \end{array} $	*	5	< 10	DM-9 Bore 2 9:2	*	*	4
				Leach DM-9 Bore 2 9:2	*	5	146				

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TABLE B-2 (Continued-3)
UBTL QUALITY CONTROL REPORT
Mountain Home AFB - Soil Analyses

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Parameter	Method	Units	Detection Limit	Spiked Sample	Initial Value	Sp1ke Conc.	Percent Recovered	Split Sample	First Value	Second Value	Method Blank
o,p-DDT	(4) 809	T/Bn	0.05					DM-9 Bore 2 9:2	*	44	*
aaa	(4) 809	1/Bn	0.02					DM-9 Bore 2 9:2	*	*	*
DDE	(4) 809	<b>1/</b> 81	0.02					DM-9 Bore 2 9:2	*	*	*
Dieldrin	(7) 809	7/Bn	0.01	$ \begin{array}{c} DM-9\\Bore 2\\9:2 \end{array} $	0.01	01	< 10	$\begin{bmatrix} DM-9 \\ Bore \\ 9:2 \end{bmatrix}$	0.01	*	*
[B-11]				Leach DM-9 Bore 2 9:2	0.01	<b>~</b>	88				
Endrin	(4)	<b>1/</b> 8n	0.01	DM-9 Bore 2	*	10	< 10	$ \begin{array}{c} DM-9 \\ Bore 2 \\ 9:2 \end{array} $	*	*	*
				Leach DM-9 Bore 2 9:2	*	5	86				

TABLE B-2 (Continued-4)
UBTL QUALITY CONTROL REPORT
Mountain Home AFB - Soil Analyses

Parameter	Method	Units	Detection Limit	Spiked Sample	Initial Value	Spike Conc.	Percent Recovered	Split Sample	First Value	Second Value	Met hod Blank
Heptachlor	(4)	T/Bn	0.01	DM-9 Bore 2 9:2	*	01	< 10	DM-9 Bore 2 9:2	*	*	*
				Leach DM-9 Bore 2	*	\$	86				
Heptachlor Epoxide	(4)	1/bin	0.01					DM-9 Bore 2 9:2	*	0.04	*
Lindane B]	608 (4)	ng/L	0.01	DM-9 Bore 2 9:2	90.00	10	< 10	$ \begin{array}{c} DM-9\\Bore 2\\9:2 \end{array} $	0.01	0.12	*
-12]				Leach DM-9 Bore 2 9:2	90.0	<b>~</b>	87				
Methoxychlor	(4)	1/Bn	0.1					$ \begin{array}{c} DM-9\\ Bore 2\\ 9:2 \end{array} $	*	*	*
Chlordane	(4)	ng/L	0.2					$ \begin{array}{c} DM-9\\ Bore 2\\ 9:2 \end{array} $	*	*	*

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Mountain Home AFB - Soil Analyses UBTL QUALITY CONTROL REPORT TABLE B-2 (Continued-5)

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Parameter	Method	Units	Detection Limit	Spiked Sample	Initial Value	Spike Conc.	Percent Recovered	Split Sample	First Value	Second	Method Blank
Toxaphene	(7) 809	<b>1/8</b> n	1.0	Leach DM-9 Bore 2 9:2	*	S	06	IM-9 Bore 2 9:2	*	*	*
alpha-BHC	(4) 809	ng/L	0.01					$ \begin{bmatrix} DM-9 \\ Bore \\ 9:2 \end{bmatrix} $	*	*	*
beta-BHC	(4)	ng/L	0.01					$ \begin{array}{c} DM-9 \\ Bore & 2 \\ 9:2 \end{array} $	*	*	*
delta-BHC ,	608 (4)	1/8n	10.0					DM-9 Bore 2 9:2	*	*	*

Test Methods for Evaluating Solid Waste, SW-846, 2nd Ed., 7-82, Modified for use on an O.I. Corp. Model 610 TOX Analyzer. (1) Results are not corrected for % moisture. (2) Test Methods for Evaluating Solid Waste, SM-846, 2nd Ed., 7-82, Modified for use on an O.I. Corp. Model 610 TOX Analyze (3) Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised 3-83, Modified for use with soil samples.

EP Tox extraction performed according to SW-846; water extract analyzed according to EPA Method 608; results reported in ug/L of water extract. (4)

Detection Iimit raised because of high background. Signifies "below detection limit." (2)

### FIELD INVESTIGATION QUALITY CONTROL PROGRAM

Quality control of field activities consists of following established procedures during the conduct of the work. In those cases that require the drilling of test borings, installation of piezometers or monitor wells, and taking of soil and water samples, the procedures include the preparation of records to document the compliance with these procedures. These field records include boring logs, monitor well installation records, daily field memoranda, sample shipment and test instruction forms for soil sample testing, and chain-of-custody records for all soil and water samples intended for chemical analyses. The nature of water sample tests was established in advance so that plans could be made to ship samples in an appropriate and timely manner.

The pH and specific conductivity meters used for field water quality measurements were calibrated with known standards immediately before the measurements were made. The HNU photoionization detector and explosimeter used to monitor vapors generated while drilling have internal calibration routines that were followed when the meters were turned on. A detailed description of sampling procedures is located in Section III.

APPENDIX C
CHAIN-OF-CUSTODY RECORDS

## DAMES & MOORE CHAIN-OF-CUSTODY RECORD

CONTRACTOR CONTRACTOR

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& Client 117		Sample I.D. No.	10-1	W-2	Westwan	Car lange										; Date Time	77.	5710 10.71-1	; Date Time	1 4/214 3 CC	.: Date Time
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APPENDIX D

ANALYTICAL REPORT SUMMARIES

TABLE D-1

COST PARAMETER CARREST PARAMETERS (SOCIETADES ASSESSED FORMANCE

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### Mountain Home AFB - Water Analyses UBTL ANALYTICAL REPORT

Parameter	Method	ū	Units	Detection Limit	W-1	W-2	West Lagoon	East Lagoon	MH-1	MH-3	4-HW	MH-5	9-HW	MH-7
TOX	9020	1) us	1/I	10.	120	55	1500	1900	82	120	65	98	59	62
TOC		(2) mg	1/1	1.	7	*	20	53	2.	•9	*	2.	*	*
011 & Grease	413.2 (		mg/L	0.4	*	*	1.6	7.4	0.5	*	*	*	*	*
Pheno1	420.2 (	(2) mg	mg/L	0.01	*	*	*	*						
Lead	_		mg/L	0.01	0.01	*	*	*						
Nickel	_		1/r	90.0	*	*	*	*						
Chromium	_		1/E	0.005	*	*	*	*						
Cadmium	213.1	(2) mg	1/r	0.01	0.02	*	*	*						
Silver	-		mg/L	0.01	*	*	*	0.01						
Aldrin	_		1/L	0,005	*	*	*	*						
p,p'-DDT		(3)	ng/L	0.02	*	*	*	*						
o,p-DDT			3/L	0.02	*	*	*	*						
aaa	_		1/1	0.01	*	*	*	*						
□ DDE	809		3/L	0.01	*	*	*	*						
Dieldrin	_		1/L	0.005	*	*	*	*						
Endrin			2/L	0.005	*	*	*	*						
Heptachlor	_		1/L	0.005	*	*	*	0.007						
Heptachlor Epoxide	Ī		1/L	0.005	*	*	*	*						
Lindane	_		1/I	0.005	*	*	*	*						
Methoxychlor			1/I	0.1	*	*	*	*						
Chlordane			1/1	0.2	*	*	*	*						
Toxaphene	Ī		1/L	1:	*	*	*	*						
alpha-BHC	) 809		1/I	0.005	*	*	*	*						
beta-BHC	_		1/I	0.01	*	*	*	*						
delta-BHC	_		ng/L	0.005	*	*	*	0.08						

<sup>(1)</sup> Test Methods for Evaluating Solid Waste, SW-846, 2nd Ed., 7-82, Modified for use on an O.I. Corp. Model 610 TOX Analyzer (2) Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised 3-83 (3) Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, 7-82 signifies "below detection limit"

TABLE D-2
UBTL ANALYTICAL REPORT

Mountain Home AFB - Soil Analyses (1)

Constant of the court of the contract of the c

Parameter	Method	Units	Detection Limit	DM-1 Bore 1 1:1	DM-1 Bore 2 1:2	DM-2 Bore 3 2:3	DM-2 Bore 7 2:7	DM-3 Bore 2 3:2	DM-3 Bore 4 3:4	DM-4 Bore 1 4:1	DM-4 Bore 4 4:4
Mojsture	Grav.			14	2.2	10	14	15	10	8.4	10
TOX	9020 (2)	ng/g	5	310	007	250	250	570	099	670	790
TOC	415.1 (3)	mg/g	0.01	3.5	0.93	0.72	3.9	5.6	0.65	11	2.4
Oil & Grease		g/gm	90.0	*	*	0.08	*	*	0.10	53	8.0
Phenol	420.2 (3)	8/8n	2							*	*
Lead	239.1 (3)	8/8n	10	28	41	37	25	26	41	33	23
Aldrin		ng/L	0.01								
p,p'-DDT		ng/L	0.05								
o,p-DDT	_	$\mu g/L$	0.05								
DDD		ng/L	0.02								
O DDE		$\mu g/L$	0.02								
Uteldrin	(4) 809	ng/L	0.01								
Endrin		ng/L	0.01								
Heptachlor	Ī	$^{ m ng/r}$	0.01			•					
Heptachlor Epoxide		ng/L	0.01			•					
Lindane		$^{ m lg}/{ m L}$	0.01								
Methoxychlor	_	ng/L	0.1								
Chlordane		ng/r	0.2								
Toxaphene		$^{ng/\mathtt{L}}$	1.0								
alpha-BHC	_	$^{1/g_{ m f}}$	0.01								
beta-BHC		$^{ m ng/L}$	0.01								
delta-BHC		ng/L	0.01								

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Parameter	DM-5 Bore 2 5:2	DM-5 Bore 6 5:6	DM-6 Bore 3 6:3	DM-6 Bore 7 6:7	DM-7 Bore 1 7:1	DM-7 Bore 2 7:2	DM-8 Bore 1 8:1	DM-8 Bore 2 8:2	DM-9 Bore 1 9:1	DM-9 Bore 2 9:2
Moisture TOX TOC 011 & Grease	8.4 890 9.9 67	6.9 250 0.27 0.48	12 4700 3.9 0.09	3.0 490 0.12 *	8.1	14	13	13	4.6	0.6
Phenol Lead	* * 39	* 24	* 27	* 13						
Aldrin p,p'-DDT					* *	* *	2.4	* *	* *	* *
o,p-DDT DDD					* 0.09	* 0.64	* 1.3	* 1.3	* 0.05	* *
ODDE - Ofeldrin					* 0.03	* 0	*0.0	* 0	* 0.07	* 0.0
Endrin Hentachlor					* *	* *	* *	0.03	* *	* *
Heptachlor Epoxide					*	*	*	*	0.07	*
Lindane Methoxychlor					* *	* *	* *	* *	0.05	0 <b>.</b> 01
Chlordane					*	<1 (5)	*	*	*	*
Toxaphene					* •	* •	* •	* •	* •	* .
alpha-BHC heta-BHC					* *	* *	* *	<b>k</b> *	* <b>*</b>	* *
deltanRHC					-	*	*	*	*	*

Results are not corrected for % moisture.

Test Methods for Evaluating Solid Waste, SW-846, Second Ed., July 1982, Modified for use with an OI Corp. Model 610 TOX Analyzer. (3)

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983, Modified for use with soil samples. (3)

EP Tox extraction performed according to SW-846, water extract analyzed according to EPA Method 608, results reported in ug/L of water extract. (4)

Detection limit raised because of high background. (2)

\*Denotes "below detection limit."

APPENDIX E

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REFERENCES

### APPENDIX E

### REFERENCES

- CH2M Hill, 1983, Installation Restoration Program Record Search for Mountain Home AFB, Idaho, for Air Force Engineering and Services Center, Directorate of Environmental Planning, Tyndall Air Force Base, Florida and Tactical Air Command, Directorate of Engineering and Environmental Planning, Langley Air Force Base, Virginia, July.
- Dames & Moore, 1983, Presurvey Report, IRP Phase IIa, Mountain Home Air Force Base, Idaho. Prepared for U.S. Air Force, Occupational and Environmental Health Laboratory, Briggs Air Force Base, Texas, October 20th.
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Young, H.W., 1977, Reconnaissance of Ground Water Resources in the Mountain Home Plateau Area, Southwest Idaho. U.S. Geological Survey Water Resources Investigations Open File Report 77-108, December. APPENDIX F
BIOGRAPHIES OF KEY PERSONNEL

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### **Curriculum Vitae**

### KENNETH J. STIMPFL

Title Partner

Expertise Environmental Analysis
Impact Assessment
Site and Route Selection

Aquatic Ecology

Experience With Firm Principal-in-Charge/Project Director

- Site selection and evaluation study for additions to existing fossil power plants. Michigan.
- Environmental assessment, permits and hearing for a new manufacturing plant in Michigan.
- Environmental baseline studies for a fossil-fueled power plant, Michigan.
- Environmental and geohydrological assessment of inactive industrial waste site, Michigan.
- Geohydrological assessment of chemically contaminated site, Michigan.
- Environmental assessment and defense in litigation for oil well development, Michigan.
- Environmental and engineering evaluation of manufacturing plant sites in Iowa, Indiana, Missouri, Michigan, Wisconsin, and Ontario.
- Ecological assessment of potential chemical contamination in the Menominee River, Wisconsin.
- Environmental assessment, preliminary containment design, and negotiation of consent judgment with state and federal agencies for a contaminated chemical plant site, Michigan.
- Site selection study for a new fossil or nuclear power plant, Michigan.
- Preparation of a regulatory compliance plan for a proposed synfuels project, Illinois.
- Radiation survey, assessment, decontamination and health physics monitoring for NRC release of contaminated plant site, Michigan.
- Wetland assessment, development of alternative layouts and agency negotiations regarding a denied 404 permit for a dock in Wisconsin.
- Assessment of environmental enhancement potential through selective dredging of the Little Calumet River for the Chicago District, Corps of Engineers.
- Assessment of potential economic impacts from a proposed regulation to ban landfill disposal of chlorinated solvents for the Illinois Department of Energy and Natural Resources.
- Assessment of aquatic impacts and effects on low-level hydroelectric potential for a variety of proposed dam modifications on the Fox River for the Chicago District, Corps of Engineers.

### Project Manager

• Aquatic ecology baseline study and impact assessment for nuclear power plant in Wisconsin, Wisconsin Electric Power Company

- Environmental baseline studies and impact assessment for copper/zinc mine in Wisconsin, Exxon Minerals Company.
- Power plant site selection study.

### Past Experience

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Sargent & Lundy Engineers, Chicago, Illinois

- Power plant site selection and evaluation studies in Illinois, Iowa, Wisconsin, Indiana, and Oklahoma.
- Ecological baseline studies and impact assessments for thirteen fossil and nuclear power plants.
- Impact assessment, route selection and evaluation of alternative designs for transmission line in West Virginia.
- Evaluation of alternate cooling systems for nuclear power plant.

Faculty Appointment, Indiana University

Assistant Professor of Zoology, Colorado State University

Academic Background B.S., zoology, Northern Illinois University M.S., zoology, Colorado State University Ph.D., limnology, Indiana University

Professiona Affiliations

Ecological Society of America; American Society of Limnology and Oceanography; Freshwater Biological Association; Societas Internationalis Limnologiae; Illinois Association of Environmental Professionals; Consulting Engineers Council of Illinois

Registration

Certified senior ecologist (Ecological Society of America)

**Publications** 

Numerous technical reports, environmental assessments and environmental reports

### **Curriculum Vitae**

### GEORGE W. CONDRAT

Title Senior Engineer

Expertise Ground Water Hydrology Engineering Geology

Mining Engineering

Experience With Firm Project Manager/Principal Investigator

- Ground water contamination evaluations including detailed site investigations, baseline and operational monitoring, predictive modelling and control measures.
- Numerical modelling of ground water flow and chemical contaminant transport from liquid and solid waste disposal sites.
- Preparation of computer programs for management of ground water and geologic data including storage and retrieval, statistical evaluation, plotting and contouring.
- Principal investigator for report of state-of-the-art of uranium tailings disposal.
- Preparation of environmental impact assessments.
- Principal investigator for ground water portion of preliminary safety analysis report for proposed nuclear power plant in Maryland.
- Studies of deep shaft dewatering requirements for uranium mines.
- Siting, design and preparation of environmental assessments for mining, milling, tailings disposal, deep well injection, and heap and in-situ leaching projects in Wyoming, Colorado, Utah, and New Mexico.
- Site selection, investigation and design of earth and tailings dams.
- Engineering geology, soils and geologic hazards investigations.
- Regional and site specific geologic, seismologic and tectonic studies for dams, power plants and other critical facilities.

Past Experience Senior Officer, Sverdrup & Parcel

Officer, U.S. Army Corps of Engineers in the United States and Vietnam

Assistant Geologist, Guggenheim Exploration Company

Academic Background Professional Degree of Geological Engineer, Colorado School of Mines

B.S., mining engineering, University of Utah

M.S. candidate, mining engineering, University of Utah

Professional Affiliations

Association of Engineering Geologists; Society of Mining Engineers of AIME; National

Water Well Association; Utah Geological Association

Registration Professional engineer, Utah, Colorado and Wvoming

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**Publications** 

THE DESCRIPTION OF THE PROPERTY OF THE PARTY

Coauthor, "Ground Water Contamination and Tailings Ponds" and "Depressurization of a Multilayered Artesian System for Water and Grout Control During Mine Shaft Development"

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### **Curriculum Vitae**

RICHARD L. JONES

Title Pro

Project Hydrogeologist

Expertise 0

Ground Water Hydrology

Geology

Experience With Firm

Project Hydrogeologist

- Ground water contamination evaluations of copper mill tailings disposal facilities, including design of deep monitoring wells, direction of field data collection, and evaluations of contaminant control alternatives.
- . Geologic and hydrologic evaluations of proposed uranium tailings disposal systems and ground water contamination investigations of existing uranium tailings impoundments.
- . Investigations of hydrocarbon contamination of aquifers beneath major oil refineries, including monitoring well system design, assessment of the nature and extent of contamination, and design of oil recovery systems.
- . Evaluations of the quantity and rate of seepage from phosphate tailings impoundments.
- . Evaluation and design of dewatering systems.
- Investigations of natural water seeps and design of seepage control facilities.
- Hydrogeologic evaluation and design of industrial water supply wells.

Past Experience

Project Manager/Senior Geologist, Engineering Enterprises

- . Hydrogeologic exploration, evaluation and well design of municipal industrial, and irrigation water supply systems.
- . Evaluation and rehabilitation of existing municipal and irrigation water well fields.
- . Evaluation and assistance in acquisition of water rights for municipal and irrigation well supplies.
- Application and development of computer aquifer models to evaluate and optimize well spacing, well construction and potential aquifer yields.
- . Studies of ground water quality in both polluted and unpolluted aquifers.

Academic Background

B.S., geology, Utah State University

M.S. and Ph.D., geology, University of Oklahoma

Professional Affiliations

American Institute of Professional Geologists; National Water Well Association; American Association for the Advancement of Science; Society of Economic Paleonotologists and Mineralogists

**Dames & Moore** 

cont....

- Registration Certified professional geologist, American Institute of Professional Geologists
- Publications Coauthor, "Proportions of Igneous, Metamorphic and Sedimentary Rocks," Geological Society of America Bulletin
  - Coauthor, "Separation of Quartz and Feldspar from Mudrock," Journal of Sedimentary Petrology
  - Senior Author, "Mineral Dispersal Patterns in the Pierre Shale," Journal of Sedimentary Petrology

### **Curriculum Vitae**

STEVEN B. JOHNSON

Title

Staff Hydrologist

Expertise

Ground Water Hydrology

### Experience With Firm

As an assistant and staff hydrologist, STEVEN B. JOHNSON has been responsible for the organization and analysis of ground and surface water data. As a principal investigator, he has conducted ground water contamination studies and operated in situ permeability apparatus. In addition, Mr. Johnson has contributed to the hydrologic analyses of siting, baseline, environmental, and final safety analysis reports for several large utilities. Some of his more pertinent experience is as follows:

- Hydrogeological investigation of industrial site, West Virginia.
- Ground water contamination study of industrial site, Michigan.
- In situ permeability study, Missouri.
- Fossil fuel power plant siting study, Wisconsin.
- Deep well sampling project, Wisconsin.
- Baseline ground water and surface water study for fossil fuel plant, Michigan.
- Baseline ground water study for nickel-zinc mine, Wisconsin.
- Nuclear final safety analysis report, ground water section, Kansas.
- Nuclear environmental report, ground water section, Kansas.
- Nuclear preliminary safety analysis report, geology section, Illinois.
- Ground water contamination study of industrial site, Ohio.
- Underground natural gas storage study, Illinois.
- Preparation of RCRA and Arizona Lazardous waste permits.
- Site selection for fossil fuel power plant wastes, Wisconsin.
- Installation of ground water monitoring system for uranium tailings pond, Wyoming.
- Investigation of nitrate contamination of ground water, Oklahoma.
- Ground water investigation and RCRA compliance at refinery, New Mexico and Utah.
- Investigation of gasoline spill at service station, Utah.
- Investigation of seepage from fertilizer tailings pond, Utah.
- Conducted pumping tests at a proposed landfill site, Utah.

### **Dames & Moore**

Academic 1975, B.A., Geology, Macalester College, St. Paul, Minnesota.

1977, M.S., Geology, Arizona State University, Tempe, Arizona.

M.S. Thesis Topic: Delayed Yield in Unconfined Aquifers.

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### $\label{eq:APPENDIX} \textbf{G}$ DAMES & MOORE HEALTH AND SAFETY PLAN

### DAMES & MOORE HEALTH AND SAFETY PLAN

Project Name and Number: Phase IIb Environmental Investigation (01016-186-07)

Project Site Location: Mountain Home Air Force Base, Idaho

Project Manager: George Condrat

On-Site Safety Officer:

Plan Preparer: Michael W. Ander Plan Reviewer: Kim Petschek

Preparation Date: February 7, 1984

### Plan Approvals:

Office Safety Coordinator

Michael W. Ander

Managing Principal-in-Charge

George W. Nicholas (date)

Project Manager

George Condrat (da

### I. PURPOSE

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The purpose of this Plan is to assign responsibilities, establish personnel protection standards, specify mandatory operating procedures, and provide for contingencies that may arise while operations are being conducted at the site.

### II. APPLICABILITY

The provisions of the Plan are mandatory for all on-site Dames & Moore employees and subcontractors engaged in hazardous material management activities including but not limited to initial site reconnaissance, preliminary field investigations, mobilization, project operations, and demobilization.

### III. RESPONSIBILITIES

### A. Project Manager

The PM shall direct on-site investigation and operational efforts. At the site, the PM, assisted by the on-site Safety Officer, has the primary responsibility for:

- 1. Assuring that appropriate personnel protective equipment is available and properly utilized by all on-site personnel.
- 2. Assuring that personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and in planned procedures for dealing with emergencies.
- 3. Assuring that personnel are aware of the potential hazards associated with site operations (see Tables 1 and 2).
- 4. Monitoring the safety performance of all personnel to ensure that the required work practices are employed.
- 5. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances.
- 6. Preparing any accident/incident reports (see attached Accident Report Form).
- 7. Assuring the completion of Plan Acceptance and Feedback forms attached herein.

### B. Project Personnel

Project personnel involved in on-site investigations and operations are responsible for:

- 1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.
- 2. Implementing Project Health and Safety Plans, and reporting to the PM for action any deviations from the anticipated conditions described in the Plan.
- 3. Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the PM.

### IV. BACKGROUND

Based on preliminary site evaluations of the Mountain Home Air Force Base, there appear to be five (5) areas that may have generated significant environmental contamination over the lifetime of the facility. Although suspected contaminants have been identified, none has been quantified. However, we anticipate that only relatively low levels of contaminants will be encountered in the proposed drilling and soil and water sampling.

Site No. 1, designated as the Lagoon Landfill Site, served as a sanitary landfill for approximately 4 years, from 1952 to 1956. In 1961-62, two wastewater lagoons were built on top of the sanitary landfill. In addition to general refuse, the lagoon landfill has received POL (waste petroleum, oils, and lubricants) products at a rate of about 6 drums per month. Also, smaller amounts of trichloroethylene and carbon tetrachloride were placed in the landfill.

Site No. 2, the "B" Street Landfill, served as the main base landfill from 1956 until 1969. It accepted sanitary and industrial wastes including POL wastes and fly ash. In the early 1960s, JP-4 and AVGAS tank cleaning sludges were disposed here. Finally, 10 to 20 drums of DDT were buried here in 1969.

Site No. 8, the existing Fire Department Training Area, has been used since 1962. Practice fires were set on the ground by burning POL wastes, waste fuels, and commingled waste oils and solvents. Since 1975, only JP-4 has been used to fuel these fires, although some unauthorized dumping of POL wastes may have occurred after 1975.

Site No. 11, the Fuel Hydrant System Leak/Spill Area, is a location where two major fuel losses have occurred. The first, in the late 1950s, was a leak in an underground fuel transmission line that allowed approximately 50,000 gallons of AVGAS to escape. The second problem was a surface spill of about 14,000 gallons of AVGAS, also in the late 1950s. As a result of both spills, fuel saturation may still exist below the ground surface.

Site No. 12, the Entomology Shop Yard, is an area that has received wash water from pesticide application equipment; as a result, the soils have low concentrations of several pesticides, including DDT.

### A. Dames & Moore Activity

Dames & Moore will drill soil borings at Sites 8, 11, and 12 and collect soil samples. Monitoring wells will be installed at Sites 1 and 2, and ground water samples will be collected. Water samples will also be collected from the lagoon at Site 1.

### B. Suspected Hazards

Suspected hazards are presented above in as much detail as is currently available. These are: POL (waste petroleum, oils, and solvents) products, trichloroethylene, carbon tetrachloride, JP-4 fuel, AVGAS fuel, and pesticides (including DDT).

### V. EMERGENCY CONTACTS AND PROCEDURES

Should any situation or unplanned occurrence require outside or support services, the appropriate contact from the following list should be made:

Agency	Person to Contact		Telephone
D&M Project Manager	G. Condrat	(office) (home)	801-521-9255 801-943-3633
D&M Industrial Hygiene and Safety Director	K. Petschek	(office) (home)	914-761-6323 212-724-6414
Police			<b>328-2256</b>
Fire			117
Ambulance			828-2233
Hospital			828-6274
Command Post Crime Stop			828-2071 828-6222

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- o Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on scene.
- o A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

- a. In the event that any member of the field crew experiences any adverse effects or symptoms of exposure while on scene, the entire field crew should immediately halt work and act according to the instructions provided by the Project Manager.
- b. The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team and reevaluation of the hazard and the level of protection required.
- c. In the event that an accident occurs, the PM is to complete an Accident Report Form for submittal to the MPIC of the office, with a copy to the Health and Safety Program Office. The MPIC should assure that followup action is taken to correct the situation that caused the accident.

### VI. HAZARD CHARACTERISTICS, MONITORING METHODS, AND PROTECTION REQUIRED

### Exposure Limits and Recognition Qualities

Information concerning exposure limits and recognition qualities of the known contaminants that are suspected to be on site is presented in Table 1.

### Symptoms of Overexposure, Potential Chronic Effects and First Aid Treatment

Symptoms of overexposure to the known suspected contaminants, potential chronic effects of these substances, and first aid treatment information are presented in Table 2.

### Monitoring Methods, Action Levels and Protective Measures

Methods for monitoring for suspected contaminants, action levels, and protective measures to be used for various contaminant concentration levels are presented in Table 3.

### Protective Equipment Required for On-Site Activities

The protective equipment required may vary, depending on the concentrations and dispersion of contaminants encountered during each phase of the work. Table 4 specifies protective equipment required for each on-site activity.

### FORM #IHST-1

### REVIEW RECEIPT

### PROJECT HEALTH AND SAFETY PLAN

Instructions: This form is to be completed by each person to work on the site and returned to the Program Director-Industrial Hygiene and Safety.

Job No. 01016-186-07

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Project: Mountain Home Air Force Base, Idaho

Rev. No. 0

I represent that I have read and understand the contents of the above plan and agree to perform my work in accordance with it.

Date 02/07/84

Signed Condrat

14 Feb 1984

TABLE 1

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### EXPOSURE LIMITS AND RECOGNITION QUALITIES

1	State	Liquid	Solid	Gas
Recognition Qualities	Odor	Ether-like odor	Weak, chemical odor	Soft, solventy, etheral, chloroform-like
,	Color	Colorless	Colorless	Colorless
_	IDLHD Level Color	300 ppm	N. A.	1000 ppm
Exposure	Standarda	pdd 5	1 mg/m <sup>3</sup>	90 ppm
	Compound	CC14 (carbon tetrachloride)	100	TCE (trichloroethylene)

aOSHA permissible exposure limit or ACGIH Threshold Limit Value.

 $\ensuremath{\mathsf{DIOLH}}$  = immediately dangerous to life or health.

TABLE 2

# SYMPTOMS OF OVEREXPOSURE, POTENTIAL CHRONIC EFFECTS AND FIRST AID TREATMENT

Potential Chronic Effects	Liver and kidney damage, suspected liver carcinogen.	Suspected liver carcinogen.	Suspected carcinogen, liver and kidney damage, cardiac arrhythmias.
Symptoms of Overexposure Skin Inhalation/Ingestion	Nausea, vomiting, dizziness, drowsiness, headache.	Tingling of tongue, lips, and face, dizziness, headache, fatigue, convulsions, sense of apprehension, vomiting.	Drowsiness, dizziness, tremor, loss of coordination, mental confusion, vomiting, abdominal cramps.
Symptoms c Skin	Irritation	Irritation	Irritation
Eye	-	Irritation	Irritation
Compound	6014	100	TCE

### General First Aid Treatment

Irrigate immediately	Soap wash promptly	Move to fresh air	Get medical attention
ye	kin	nhalation	ngestion

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TABLE 3

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HAZARD MONITORING METHOD, ACTION LEVELS, AND PROTECTIVE MEASURES

Protective Measures	Continue working.	Continue working with continuous monitoring.	EVACUATE the area; EXPLOSION HAZARD.	Don respirator. See Table 1 for exposure standards.
Action Level	<10% LEL*	10 - 25% LEL	>25% LEL	>5 units
Monitoring Method	Explosimeter or	combustible gas meter		HNU continuous recorder
Hazard	Explosive	atmosphere		Toxic atmosphere

<sup>\*</sup>Lower Explosive Limit (LEL) for ICE = 12.5%.

TABLE 4
PROTECTIVE EQUIPMENT

Level	Protective Equipment	Criteria for Use
С	Full-face respirator with air-purifying cartridges for gas/dusts	When drilling or sampling where dusts become airborne, when organic odors are noticeable, or as indicated by HNU.
	Disposable coveralls	
	Rubber boots	
	Hard hat with splash shield or safety glasses/goggles	
	Nitrile gloves	
D	Rubber boots	During sampling activities other than those mentioned above
	Disposable coveralls (optional)	
	Nitrile gloves	
	Safety glasses or goggles	
	Hard hat	

# ATTACHMENT 1

# PROTECTIVE EQUIPMENT

# I. INTRODUCTION

When field investigation activities are conducted where atmospheric contamination is known or suspected to exist, where there is a potential for the generation of vapors or gases, or where direct contact with toxic substances may occur, equipment to protect personnel must be worn. Respirators are used to protect against inhalation and ingestion of atmospheric contaminants. Protective clothing is worn to protect against contact with and possible absorption of chemicals through the skin. In addition to protective clothing and respiratory protection, safe work practices must be followed. Good personal hygiene practice prevents ingestion of toxic materials.

Personnel equipment to be used has been divided into two categories commensurate with the degree of protection required, namely Levels C and D protection.

# II. LEVELS OF PROTECTION

# A. Level C

# 1. Personal Protective Equipment

- o Air-purifying respirator (MSHA/NIOSH approved)
- o Disposable chemical resistant coveralls
- o Gloves, outer, working gloves
- o Gloves, inner, chemical resistant
- o Boots, steel toe and shank
- o Hard hat (face shield)
- o Rubber boots, outer, chemical resistant (disposable)

# 2. Criteria for Selection

- a. Air concentrations of identified substances are such that reduction to at or below the substance's exposure limit is necessary and the concentration is within the service limit of the cartridge.
- b. Atmospheric contaminant concentrations do not exceed the Immediately Dangerous to Life or Health (IDHL) levels.
- c. Contaminant exposure to unprotected areas (head and neck) are within skin exposure guidelines, or dermal hazards do not exist.
- d. Job functions have been determined not to require a higher level of protection.

# B. Level D

# 1. Personal Protective Equipment

- o Coveralls
- o Boots/shoes, safety or chemical resistant, steel toe and shank
- o Boots, outer (chemical resistant disposables)
- o Hard hat (face shield)
- o Gloves

# 2. Criteria for Selection

- a. No indication of any atmospheric hazards.
- b. Work function precludes dusting, splashes, immersion, or potential for exposure to any chemicals.

# 3. Guidance on Selection Criteria

- a. Level D protection is primarily a work uniform and should not be worn in any area where the potential for contamination exists.
- b. In situations where respiratory protection is not necessary, but site activities are needed, chemical resistant garments high quality or disposable must be worn.

# **III.** RESPIRATORY PROTECTION

The following procedures should be used for respiratory protection:

- A. Inspect all washers, diaphragms, and facepiece-to-face seal area for any tears, pinholes, deformation, or brittleness. Should any of these exist, use a different respirator.
- B. Place the respirator on the face, tighten and use both a positive and a negative pressure test, prior to entering the site, to assure a proper fit. Checking for proper fit involves the following:

# 1. Negative Pressure Test

Close off the inlet opening of the cartridge or the breathing tube by covering it with the palm of the hand or by replacing the tap seal. Gently inhale so that the facepiece collapses slightly, and hold the breath for 10 seconds. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is satisfactory.

# 2. Positive Pressure Test

Remove the exhalation valve cover. Close off the exhalation valve with the palm of the hand. Exhale gently so that a slight positive

pressure is built up in the facepiece. If no outward leakage of air is detected at the periphery of the facepiece, the face fit is satisfactory. (Note: With certain devices, removal of the exhaust valve cover is very difficult, making the test almost impossible to perform.)

# ATTACHMENT 2

# DAMES & MOORE STANDARD OPERATING PROCEDURES

# WORK PRACTICES

- 1. Smoking, eating, drinking, and chewing tobacco are prohibited in the contaminated or potentially contaminated area.
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surface (i.e., ground, etc.).
- 3. All field crew members should make use of their senses (all senses) to alert them to potentially dangerous situations (i.e., presence of strong and irritating or nauseating odors).
- 4. Prevent, to the extent possible, spillages. In the event that a spillage occurs, contain liquid if possible.
- 5. Prevent splashing of the contaminated materials.
- 6. Field crew members shall be familiar with the physical characteristics of investigations, including:
  - o wind direction
  - o accessibility to associates, equipment, vehicles
  - o communication
  - o hot zone (areas of known or suspected contamination)
  - o site access
  - o nearest water sources
- 7. The number of personnel and equipment in the contaminated area should be minimized consistent with site operations.
- 8. All wastes generated during D&M and/or subcontractor activities on site should be disposed of as directed by the Field Activity Leader.

# HALF-FACE RESPIRATORS

# INSPECTION PROCEDURE

- 1. Look for breaks or tears in the headband material. Also stretch to check the elasticity.
- Make sure all headbands, fasteners, and adjusters are in place and not bent.
- 3. Check the facepiece for dirt, cracks, tears, or holes. The rubber should be flexible, not stiff.
- 4. Look at the shape of the facepiece for possible distortion that may occur if the respirator is not protected during storage.
- 5. Check the exhalation valve located near the chin between the cartridges by the following:
  - Unsnap the cover;
  - Lift the valve and inspect the seat and valve for cracks, tears, dirt, and distortion; and
  - Replace the cover. It should spin freely.
- 6. Check both inhalation valves (inside the cartridge holders). Look for same signs as above.
- 7. Check the yoke for cracks.
- 8. Make sure the cartridge holders are clean. Make sure the gaskets are in place and the threads are not worn. Also look for cracks and other damage.
- 9. Check the cartridges for dents or other damage, especially in the threaded part.

# DONNING PROCEDURE

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- 1. Screw the cartridge into the holder hand-tight so there is a good seal with the gasket in the bottom of the holder, but don't force it. If the cartridge won't go in easily, back it out and try again.
  - Always use cartridges made by the same manufacturer who made the respirator.
- 2. Place the facepiece over the bridge of your nose and swing the bottom in so that it rests against your chin.
- 3. Hold the respirator in place and fasten the top strap over the crown of your head.

- 4. Fit the respirator on your face and fasten the strap around your neck. Don't twist the straps. Use the metal slide to tighten or loosen the fit, but not too tight.
- 5. Test the fit by:

- Lightly covering the exhalation valve with the palm of your hand. Exhale. If there is a leak, you will feel the air on your face.
- Covering the cartridges with the palms of your hands. Again, don't press too hard. Inhale. The facepiece should collapse against your face.
- If there is a leak with either test, adjust the headbands or reposition the facepiece and test until no leakage is detected.

# SANITIZING PROCEDURE

- 1. Remove all cartridges, plugs, or seals not affixed to their seats.
- 2. Remove elastic headbands.
- 3. Remove exhalation cover.
- 4. Remove speaking diaphragm or speaking diaphragm/exhalation valve assembly.
- 5. Remove inhalation valves.
- 6. Wash facepiece and breathing tube in cleaner/sanitizer powder mixed with warm water, preferably at 120° to 140°F. Wash components separately from the facemask, as necessary. Remove heavy soil from surfaces with a hand brush.
- Remove all parts from the wash water and rinse twice in clean warm water.
- 8. Air dry parts in a designated clean area.
- 9. Wipe facepieces, valves, and seats with a damp lint-free cloth to remove any remaining soap or other foreign materials.

# PLAN FEEDBACK FORM

Problems with plan requirements:
,
Unexpected situations encountered:
Recommendations for future revisions:

PLEASE RETURN TO THE FIRMWIDE HEALTH AND SAFETY OFFICE - WP

# ACCIDENT REPORT FORM

SUPERVISOR'S REPORT OF ACCI	IDENT	DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENTS
TO FROM		
TELE	PHONE (include area co	ode)
NAME OF INJURED OR ILL EMPLOYEE		
DATE OF ACCIDENT TIME OF ACCIDENT EX	VACT LOCATION OF ACCIDE	.NT
NACOATIVE OCCOUNT ION OF ACCIDENT		
NARRATIVE DESCRIPTION OF ACCIDENT		
NATURE OF ILLNESS OR INJURY AND PART OF BOD	Y INVOLVED	LOST TIME YES   NO
		153 17 10 11
PROBABLE DISABILITY (check one)	· · ·	
	LOST WORK DAY WITH	NO LOST FIRST AID WORK DAY ONLY
<u> </u>	ACT IVITY	
Li Li		
CORRECTIVE ACTION TAKEN BY REPORTING UNIT		
CORRECTIVE ACTION THAT REMAINS TO BE TAKEN	(by whom and by when)	
NAME OF SUPERVISOR	TITLE	
SIGNATURE	DATE	

# Photoionization Detector

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- 1. Before attaching the probe, check the function switch on the control panel to make sure it is in the off position.
- 2. Attach the probe by plugging in the 12 pin plug to the interface on the readout module.
- 3. Turn the six position function switch to the battery check position. The needle on the meter should read within or above the green battery arc on the scale. If not, recharge the battery. If the red indicator comes on, the battery should be recharged.
- 4. Turn the function switch to any range setting. Look into the end of the probe briefly to see if the lamp is on. If it is on, it will give a purple glow. Do not stare into the probe for any length of time as UV light can damage your eyes. The instrument is now ready for operation.
- 5. To zero the instrument, turn the function switch to the standby position and rotate the zero potentiometer until the meter reads zero. Clockwise rotation of the span pot produces a downscale deflection while counterclockwise rotations yields an upscale deflection. Note: No zero gas is needed since this is an electronic zero adjustment. If the span adjustment setting is changed after the zero is set, the zero should be rechecked and adjusted, if necessary. Wait 15 to 20 seconds to ensure that the zero reading is stable. If necessary, readjust the zero.
- 6. Turn function switch to the 0-20, 0-200, or 0-2000 position.
- 7. Place probe in the atmosphere to be monitored if the needle moves to the upper limit of the scale change the function switch to the next position.

# Combustible Gas Indicators (CGIs)/Explosimeters

In addition to the instructions found below, all CGIs should be calibrated prior to use, in a noncontaminated, fresh air environment. Furthermore, units incorporating an aspirator bulb or other air-drawing device should be checked for leaks in the folling manner:

- Attach all hoses, probes, and other air-drawing devices to CGI
- Place a finger over probe or hose end.
- Operate pump or squeeze aspirator bulb.

In a leak-free system, bulb remains collapsed or pump labors. In a leaking system, bulb regains its shape or pump does not labor.

- a. MSA Explosimeter Combustible Gas Indicator
  - Turn Explosimeter on by lifting end of "On-Off" bar on "Rheostat" knob and rotating "Rheostat" knob clockwise 1/4 turn.
  - 2. Flush instrument with fresh air by squeezing and releasing aspirator bulb about five times.
  - 3. Rotate "Rheostat" knob until meter needle rests at zero. (Avoid large clockwise rotation, which sends large current through filament, perhaps shortening its useful life).
  - 4. To sample, place hose or probe end in atmosphere to be measured and operate aspirator bulb about five times.

- 6. Turn Explosimeter off by lifting end of "On-Off" bar on "Rheostat" knob and rotating it counterclockwise until it "clicks". "On-off" bar retracts into "Rheostat" knob.
- b. Bacharach Oxygen/Combustible Gas Indicator, Model GPK
  - Rotate "Function" switch clockwise to "Volt Test" position. To avoid decalibration, all knobs must be pulled and rotated at the same time. Motor starts and the "% Oxygen" and "Sniffer" move up scale.
  - Rotate "Volt Adj" knob to bring "Gas Detector" needle over green arrow.
  - 3. Turn "Function" switch clockwise to "On". The "% Oxygen" needle should rise to about 20.8% and "Gas Detector" needle should drop to about zero.
  - 4. Rotate "Oxy Cal" knob to adjust "% Oxygen" needle to black "Calibrate" line.
  - Rotate "Zero Adj" knob to adjust "Gas Detector" needle to zero.
  - 6. Momentarily place finger over hose or thread "Air Intake" nipple and observe the pump working.
  - 7. To sample, place hose end and probe in atmosphere to be measured. Within 30 seconds, steady-state readings are indicated on "% Oxygen" and "Gas Detector" scales.
  - 8. Rotate "Function" switch counterclockwise to "Off".

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APPENDIX H
SCOPE OF WORK

# INSTALLATION RESTORATION PROGRAM PHASE II TASK DESCRIPTION MOUNTAIN HOME AFB ID

#### I. DESCRIPTION OF WORK

The purpose of this task is to determine if environmental contamination has resulted from waste disposal practices, fuel spills, pesticide contamination and fire training activities at Mt Home AFB ID; to provide estimates of the magnitude and extent of contamination, should contamination be found; to identify potential environmental consequences of migrating pollutants; to identify any additional investigations and their attendant costs necessary to identify the magnitude, extent and direction of movement of discovered contaminants.

Ambient air monitoring of hazardous and/or toxic material for the protection of contractor and Air Force personnel shall be accomplished when necessary, especially during the drilling operation.

The presurvey report (mailed under separate cover) and Phase I IRP report (mailed under separate cover) incorporated background and description of the sites for this task. To accomplish the survey effort, the contractor shall take the following steps:

# A. General

- 1. Collect and analyze one sample from each of the existing wells (production or otherwise). A maximum of 6 wells shall be sampled. If the well(s) cannot be sampled due to well development, well characteristics (and or other reason), the contractor shall indicate the reason(s) in the report pecified in Item VI below.
- a. The U.S. Air Force shall provide to the contractor well logs and other pertinent wells records and information to determine that samples collected are representative.
- b. All water samples collected in A.1. above shall analyzed for oil and grease IR Method (EPA Method 413.2), total organic carbons (EPA Method 415.1) and total organic halogens (EPA Method 9020). Required detection limits for above analysis are specified in Atch 1.
- 2. The areal extent of each site shall be determined by reviewing available aerial photos of the base, and by field reconnaissance.
- 3. Each location where surface water, sediment, or core samples are collected shall be marked with a permanent marker (where practical), and the location recorded on a project map for the site.

4. All the water samples collected from each well and the lagoon locations shall be analyzed on site for pH, temperature, and specific conductance. Sampling, maximum holding time, and preservation of the samples will strictly comply with the following references: Standard Methods for the Examination of Water and Wastewater, 15th Ed. (1980); ASTM, Part 31 (1980); and methods for Chemical Analysis of Water and Wastes, EPA Manual 600/4-79-020 (1979).

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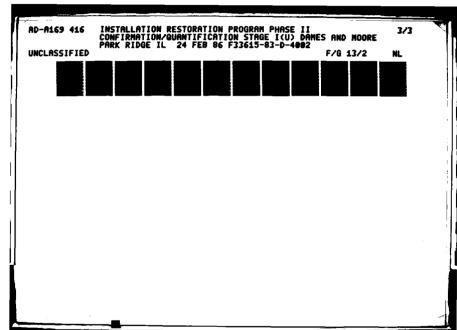
- 5. All the water and soil samples shall be analyzed in the laboratory for the parameters specified by site in Atch 2. Minimum detection limits for analyses are shown in Attachment 1.
- B. In addition to items delineated in A above, conduct the following specific actions at the following identified sites:

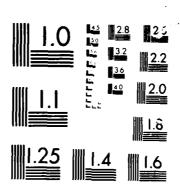
# 1. Lagoon Landfill (Site 1)

- Complete and sample a monitor well to the main water table below the site. Drill to a depth of about 50 feet below the water table and screen from about 10 feet above the water table to the bottom of the well, with an estimated depth to be approximately 450 feet. The upper 50 feet of the initial boring shall be grouted and cased prior to drilling below that level. It is proposed to drill a 12-inch hole to 50 feet, set 8-5/8 inch OD steel casing to 50 feet, and grout to the ground surface. The grout shall consist of neat cement or sand-cement with the addition of up to 4 percent bentonite. If severe formation losses occur, lost circulation materials or bentonite shall be used for the remaining grouting. After the grout has set, an 8-inch hole shall be advanced to the total depth of the well. A four-inch diameter, flush-threaded Schedule 80 PVC blank pipe and PVC saw-cut screen shall then be lowered into the well. The plastic casing and screen shall be joined with threaded joints, and no adhesive compounds or solvents will be used. A sand pack shall then be tremied into place around the annulus of the screen. The sand pack material shall consist of a clean, washed quartzose sand. Three feet of bentonite pellets shall then be placed on the 8-inch diameter steel pipe to protect the inner PVC casing. The well shall be cleaned and developed by pumping or bailing.
- b. A geologic log shall be prepared for the boring based upon cutting samples and drilling characteristics.
- c. One water sample shall be collected from the well. A minimum of three times the volume of standing water in the well shall be removed prior to taking samples. The static water level in the well shall be measured.
  - d. One water sample shall be collected from sewage lagoon 2.

# 2. B Street Landfill (Site 2)

a. Drill a single well to the main water table near the southern perimeter of the B Street Landfill. The work effort shall be as defined in I.B.1 (Site 1) above.





b. Collect one ground water sample.

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# 3. Existing Fire Dept Training Area (Site 8)

- a. Drill and sample three borings to depths of 10 feet or refusal, whichever is shallower, using hollow stem auger techniques.
- b. Samples shall be taken utilizing split spoon sampling techniques at intervals of approximately 18 inches from the ground surface to the total depth of the boring.
- c. Upon completion, each borehole shall be backfilled with granular bentonite to within 1 foot of the ground surface. The upper 1 foot of borehole shall be backfilled with natural soil.
- d. Based upon visual inspection and HNU readings, two samples from each boring, one in the upper half of the boring and one in the lower portion, shall be selected for laboratory analysis.
- e. All soil samples shall be shipped under refrigeration to the chemical laboratory for possible subsequent analysis. Soil samples not selected for analysis shall be frozen and archived for a period of 6 months. Soil samples shall be analyzed for the parameters listed in Atch 2.

# 4. Fuel Hydrant System Leak/Spill Area (Site 11)

- a. Drill and sample three borings to depth of 10 feet or refusal, whichever is shallower, using hollow auger techniques. The work effort shall be as defined in I.B.3. (Site 8) above.
- b. All borings shall be drilled into soil southwest of the aircraft apron.

# 5. Entomology Shop Yard (Site 12)

- a. Drill and sample three shallow borings to depths of approximately 5 feet.
- b. Obtain two soil samples from each boring over the intervals of 0 to 0.5 foot in depth and 1.0 to 1.5 feet in depth.
  - c. Obtain additional soil samples at depths of 3 and 5 feet.
- d. The borings shall be located at 10, 20, and 30 feet from the northwest wall of the Entomology Shop building.
- e. Two shallow soil samples (over the intervals of 0-0.5 feet and 1.0-1.5 feet) from each boring shall be analyzed for pesticides as listed in Atch 1.
- f. The two deeper samples (at depths of 3 and 5 feet) from each hole will be stored for potential future analysis.

# C. Well Installation and Cleanup

The well and boring area shall be cleaned following the completion of each well or boring. Drill cuttings shall be removed and the general area cleaned. If hazardous waste is generated in the process of well installation the contractor shall be responsible for proper containerization (according to local Civil Engineering Office requirements) for eventual government disposal. Disposal of drill cuttings are not the responsibility of the contractor. the well. Drill cuttings shall be removed and the general area cleaned.

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#### D. Data Review

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Results of sampling and analysis shall be tabulated and incoporated in the Informal Technical Information report (Atch 1, Seq 3 and Atch 3, Seq 2 as specified in VI below) and forwarded to USAF OEHL/CVT for review.

# E. Report Preparation

- 1. A draft final report delineating the findings of this field investigation shall be prepared and forwarded to the USAF OEHL as specified in Item VI below. The report shall include a discussion of the regional hydrogeology, well logs of all project wells, data from water level surveys, water quality analysis results, available geohydrologic cross sections, groundwater surface and gradient vector maps, vertical and horizontal flow vectors and Laboratory quality assurance information. The report shall follow the USAF OEHL supplied format (mailed under separate cover).
- 2. Estimates shall be made of the magnitude, extent and direction of movement of contaminants discovered. Potential environmental consequences of discovered contamination must be identified. Where survey data are insufficient to properly determine or estimate the magnitude, extent and direction of movement of discovered contaminants, specific recommendations, fully justified, shall be made for additional efforts required to properly evaluate contamination migration and included in a separately bound appendix to the draft final report (see F below).

# F. Cost Estimates

The contractor shall provide estimates for all additional work recommended to permit proper determination of contaminants. The recommendations provided shall include all efforts required to determine the magnitude and direction of movement of discovered contaminants along with an estimate of the time required to accomplish the proposed effort. This information shall be provided in a separately bound appendix to the draft final report.

# II. SITE LOCATION AND DATES:

Mt Home AFB ID Building, Time and Dates to be established

# III. BASE SUPPORT: None

- IV. GOVERNMENT FURNISHED PROPERTY: None
- V. GOVERNMENT POINTS OF CONTACT:
  - 1. Capt Bob Sarvaideo
    USAF OEHL/CVT
    Brooks AFB TX 78235
    (512) 536-3667
    AV 240-3667
- 3. Col Jerry Dougherty
  HQ TAC/SGPAE
  Langley AFB VA 23665
  (804) 764-5035
  AV 432-2180
- 2. Capt Gene Killan USAF Hosp/SGPB Mt Home AFB ID 83648 (208) 828-6026 AV 857-6026
- VI. In addition to sequence numbers 1, 5 and 10 listed in Atch 1 to the contract, which are applicable to all orders, the reference numbers below are applicable to this order. Also shown are data applicable to this order.

Sequence No.	Block 10	Block 11	Block 12	Block 13	Block 14
Atch 1					
4	ONE/R	5.5 MAC	6 MAC	9 MAC	•
Atch 3	ONE/T	**	**	i	
2	ONE/T	<b>**</b>	**	1	

\*A minimum of two draft reports will be required. After incorporating Air Force comments concerning the first draft report, the contractor shall supply the USAF OEHL with a second draft report. The report shall be forwarded to the applicable regulatory agencies for their comments. Contractor shall supply the USAF OEHL with 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report.

VII. The ceiling price of Items 0001 and 0002, as contemplated by the payments clause, is \$

<sup>\*\*</sup>Upon completion of analysis.

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# RECOMMENDED LEVELS OF DETECTION (PER USAF OEHL/SA) (19 Aug 1983)

GENERAL ORGANICS: Detection limits are for water unless shown otherwise:

	ORGANIC ANALYTE	DETECTION LIMIT (µg/L)
	Chemical Oxygen Demand	5000
	Hydrazine	10
	Oil and Grease (IR)	100 (100 $\mu g/g$ , soil)
	Polychlorinated Biphenyls	0.25 (1 $\mu g/g$ , soil*)
	Pheno1	1
***	Total Organic Carbons(TOC)	1000
***	Total Organic Halogen(TOX)	5 (5 $\mu$ g/g, soil)
	Volatile Organic Compounds (VOC)	**

<sup>\*</sup>Identify type if possible.

INORGANICS: Detection limits are for water unless shown otherwise:

INORGANIC ANALYTE	DETECTION LIMIT (µg/L)
Arsenic	10
Boron	100
Cadmium	10
Chloride	1000
Copper	50
Chromium	50 (5 $\mu$ g/g, soil)
Cyanide	10
Iron (total)	100
Lead	20 (2 $\mu$ g/g, soil)
Manganese	50
Mercury	1
Nickel	100
Nitrates	100
Silver	10
Sodium	1000
Specific Conductance	1*
Sulfate	1000
Total Dissolved Solids	1000 .
Zinc	50

<sup>\*</sup>Concentration is in micromhos

<sup>\*\*</sup>Per EPA Method 503.1, 601 and 602. Report in µg/g for soils.

<sup>•••</sup>Detection levels for TOC and TOX must be 3 times the noise level of the instrument. Laboratory distilled water must show no response. If so, corrections of positive results must be made.

PESTICIDES: Analyze samples for chlorinated hydrocarbon and organophosphate pesticides. Detection limits are for water unless shown otherwise:

PESTICIDE ANALYTE	CONC	(μg/L)
Aldrin	0.02	
DDT isomer	0.02	
Dieldrin	0.02	
Endrin	0.02	
Heptachlor	0.02	
Heptachlor epoxide	0.02	
Lindane	0.01	
Methoxychlor	0.20	
Diazinon	0.02	
Malathion	0.10	
Parathion	0.02	
Toxaphene	1.00	
2,4-D	0.06	
2,4,5-T	0.06	
2,4,5-TP silvex	0.06	
Chlordane	0.20	
alpha-BHC	0.02	
beta-BHC	0.02	
delta-BHC	0.02	

For soils, use the detection levels shown above, but report values as micrograms pesticide per gram of soil.

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# PROPOSED PHASE IIB ANALYSES

	FIELD MEASUREMENTS <sup>B</sup>	TOX, TOC, AND OIL AND GREASE	HEAVY METALS	PHENOLS	PEST IC IDES <sup>b</sup>	REMARKS
Surface Mater Sampling						
Lagoon Landfill (Site 1) and Sewage Lagoon 2	×	×	ሂ <sub></sub>	×	×	2 samples
Monitoring Wells						
Lagoon Landfill (Site 1)	×	×	S <sub>e</sub>	×	×	l sample
8 Street Landfill (Site 2)	×	×	ጵ	×	×	l sample
Sail Sampling						
Existing fire Department Training Arca (Site 8)		*	P <sub>x</sub>	×		<pre>6 samples (3 locations, 2 depths)</pre>
Fire Hydrant System Leak/Spill Area (Site 11)	•	×	₽.			6 samples (3 locations, 2 depths)
Entomology Shop Yard (Site 12)					e×	6 samples (3 locations, 2 depths)

afield measurements consist of pH, temperature, and conductivity.

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Dpesticides consist of aldrin, DDD, DDE, dieldrin, endrin, heptachlor, heptachlor epoxide, lindane, DDI, methoxychlor, chlordane, alpha-BMC, beta-BMC, delta-BMC, and toxaphene.

Cine following heavy metols will be analyzed: lead, nickel, chromium, cadmium, and silver.

diotal lead only, by nitric acid digestion.

<sup>&</sup>lt;sup>c</sup>EP toxicity extraction.

APPENDIX I

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DEFINITIONS, NOMENCLATURE, AND UNITS OF MEASUREMENT

# APPENDIX I

# DEFINITIONS, NOMENCLATURE, AND UNITS OF MEASUREMENT

ac-ft/yr Acre-feet per year

AFB Air Force Base

alluvium Unconsolidated sediments deposited during comparatively recent

geologic time by a stream or other body of running water.

aquifer A geologic formation, group of formations, or part of a formation that

is capable of yielding water to a well or spring.

aromatic Designating cyclic organic compounds characterized by a high degree

of stability in spite of their apparent unsaturated bonds and best exemplified by benzene and related structures, but also evident in

other compounds.

artesian Ground water confined under hydrostatic pressure.

as N As weight of nitrogen

AVGAS Aviation gasoline

caliche An opaque, reddish brown to buff or white calcareous material of

secondary accumulation (in place), commonly found in layers on, near, or within the surface of stony soils of arid and semiarid regions, but also occurring as a subsoil deposit in subhumid climates. The cementing material is essentially calcium carbonate, but may contain

magnesium carbonate, silica, or gypsum.

CGWA Critical ground water area

cm/sec Centimeter(s) per second

DEQPPM Defense Environmental Quality Program Policy Memorandum

DOD Department of Defense

downgradient In the direction of decreasing hydraulic static head; the direction in

which ground water flows.

effluent A liquid waste discharge from a manufacturing or treatment process, in

its natural state, or partially or completely treated, that discharges

into the environment.

°F Degrees Fahrenheit

ft Foot, feet

gpd/ft Gallon(s) per day per foot

gpm Gallon(s) per minute

gpm/ft Gallon(s) per minute per foot of drawdown

HNU A type of photoionization detector for measurement of organic

vapors

hydraulic In an aquifer, the rate of change of pressure head per unit of

gradient distance of flow at a given point and in a given direction.

in. Inch, inches

IRP Installation Restoration Program

mg/g Milligram(s) per gram

mg/L Milligram(s) per liter

ml Milliliter(s)

μg/g Microgram(s) per gram

ug/L Microgram(s) per liter

MOGAS Motor gasoline

monitor A well used to measure ground water levels and to obtain samples.

well

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No. Number

NPDES National Pollutant Discharge Elimination System

OEHL Occupational and Environmental Health Laboratory

pH Negative logarithm of hydrogen ion concentration; measurement of

acids and bases.

PDWS Primary drinking water standard(s)

percolation Movement of moisture by gravity or hydrostatic pressure through

interstices of unsaturated rock or soil.

permeability The property or capacity of a porous rock, sediment, or soil for

transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under

unequal pressure.

phenols Any of various acidic compounds analogous to phenol and regarded as

hydroxyl derivatives of aromatic hydrocarbons.

Pleistocene An epoch of geologic time thought to have covered the span between

1.6 million and 10,000 years ago.

POL Petroleum, oil and lubricants

porosity The property of a rock, soil, or other material of containing

interstices.

potentiometric An imaginary surface representing the static head of ground water

surface and defined by the level to which water will rise in a well.

Precambrian Geologic time before the beginning of the Paleozoic; it is equivalent to about 90 percent of geologic time and ended approximately

570 million years ago.

PVC Polyvinyl chloride

QC Quality control

RCRA Resource Conservation and Recovery Act

specific The rate of discharge of a water well per unit of drawdown, capacity commonly expressed as gallons per minute per foot.

specific With reference to the movement of water in soil, a factor expressing conductivity the volume of transported water per unit of time in a given area.

STP Sewage treatment plant

TAC Tactical Air Command

TDS Total dissolved solids

Tertiary The first period of the Cenozoic era, thought to have covered the

span of time between 66 and 3 to 2 million years ago.

TOC Total organic carbon

TOX Total organic halogens

transmissivity The rate at which water is transmitted through a unit width under a

unit hydraulic gradient.

USAF United States Air Force

USEPA United States Environmental Protection Agency

USGS United States Geological Survey

water table That surface of a body of unconfined ground water at which the

pressure is equal to that of the atmosphere.